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To Enforce Ceiling Price on Waste Paper

OPA Starts Injunction Action Against Seven Dealers And Brokers And Two Paper Mills—Demands Treble Damage Against Thomas Galante & Sons, Inc. and Galante Trucking Co. For $111,900.

Injunction actions were started last Thursday against nine waste paper dealers and mills in Federal Court in Manhattan to restrain them from violating OPA ceiling price regulations, it was announced by Edward L. Coffey, chief attorney of the New York District OPA. The court actions were taken against seven dealers and brokers and two mills. In addition, a permanent injunction was entered against a third mill, charged with purchasing waste paper at over-ceiling prices.

Charge With Violating Regulation

A suit for a permanent injunction was commenced against Thomas Galante & Sons, Inc., ABC Fibre Corporation and Galante Trucking Corporation, waste paper suppliers, all of East 149th street and East River, Bronx, New York, and the Consolidated Paper Company, a paper mill at Monroe, Mich., charging them with the sale and purchase of waste paper at over-ceiling prices and with conspiracy to evade Maximum Price Regulation No. 30, covering sale of waste paper. In addition, the complaint, filed by Mitchell Jelline, chief enforcement attorney, demands treble damages against Thomas Galante & Sons., Inc. and Galante Trucking Corporation for $111,900.18.

In another action filed by Mr. Jelline, D. Benedette, Inc., waste paper dealer of 420 Lexington avenue, New York City and Great Lakes Paper Stock, Inc., waste paper dealers, located in Buffalo, were named as defendants with Robert Gair Company, Inc., paper board manufacturer, 155 East 44th street, New York City, operating mills and box factories in New York, New Jersey, Connecticut, Pennsylvania and Ohio, and charged with selling and purchasing waste paper at over-ceiling prices.

Actions were also filed to restrain V. A. Pugliese & Sons Company, 177 South street, Manhattan, and Banner Products Company, Inc., 1463 Crotona Place, Bronx, New York, waste paper dealers, to restrain them from violating Maximum Price Regulation No. 30, upon complaints charging them with having sold waste paper above the legal maximum price.

A permanent injunction, which was signed by Federal Judge Edward A. Conger, was entered against San-Nap-Pak Manufacturing Company, Inc., 1440 Broadway, New York City, with mills at Rockland, Del., and Wheelwright, Mass., restraining that company from buying waste paper at over the ceiling prices or otherwise violating the regulation. The injunction order was consented to by San-Nap-Pak Manufacturing Company, Inc., which, however, did not admit the charges against it. These cases followed upon the filing of action by the district OPA last week against John D. Greco, Inc., waste paper broker for an injunction and treble damages of $60,880.47.

The drive against violators of the OPA waste paper price regulations is under the direction of Arthur G. Warner, head of the Industrial Materials Enforcement Unit of the district OPA.

Equally Guilty With Seller

Mr. Coffey, in commenting on the court actions said: "The steadily increasing demand for waste paper due to the shortage of wood pulp and the needs of war production constitutes a major industrial problem. The OPA cannot permit waste paper dealers or brokers to take advantage of the situation and raise prices above the legal maximum. At the same time the paper mills must understand that the purchaser of waste paper at over-ceiling prices is equally guilty with the seller.

"Housewives, who patriotically accumulate paper bags, paper boxes, wrapping paper and other waste papers, must not be used as a tool by dealers who seek to profiteer.

"All waste paper suppliers and consumers are cautioned against upgrading, weight-rigging or making improper loading, transportation and brokerage charges in order to evade the price ceilings."

Paper Mill Shipments Lower

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., Aug. 25, 1943—June index of the value of paper mill shipments was 139 compared with 154 in May and 165 in June of last year taking an average month in 1939 at 100 according to the monthly industry survey of the Department of Commerce.

Wisconsin Newspapers Drive for Pulpwood

Publicity Starts To Avert Critical Shortage of Wood Faced By Mills This Winter—Mill Puts On More War Production Program — Explains Possibilities of Pluswood — Other Industrial News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., August 23, 1943—Wisconsin newspapers are getting under way in their patriotic publicity drive to avert the critical shortage of pulpwood facing the mills this winter. Committees are being made up to work with the publishers to spread the word to farmers to harvest their woodlots and deliver their wood to the mills.

At Wisconsin Rapids, Wis., The Daily Tribune has started a series of articles appealing for wood. Assisting H. R. Lathrope, agricultural agent of Wood county, are E. B. Hurst, director of the forestry department of the Consolidated Water Power and Paper Company, and F. G. Kilp, head forester of the Nekoosa-Edwards Paper Company. The vital role the farmer has in this situation is being pointed out, with accompanying information as to how important the wood supply is to the actual war effort.

The Eagle-Star, Marinette, Wis., also has launched its campaign. It is expected to be highly productive, because Marinette County and the adjacent area are heavily wooded, and much production can be expected there. F. G. Sappington, publisher, has appointed a committee headed by Charles B. Drewry, county agricultural agent. Among those serving on the committee are John P. Johnson, pulpwood buyer for the Marinette Paper Company; R. B. Goodman, forestry authority and former chairman of the Wisconsin Conservation Commission; Robert Taylor, pulpwood buyer for the Stevens Point Pulp and Paper Company, and Roy Gustaveson, pulpwood jobber.

In order to prevent ruthless slashing of woodlots and forest tracts, the publicity places emphasis on selective cutting, with instructions to farmers and woodcutters as to what wood to cut and what constitutes sound practices.

Puts on More War Production Program

As a stimulus to greater production of war materials, Kimberly-Clark Corporation, Neenah, Wis., put on a program Thursday of last week, sponsored by the United States Navy. The employees were assembled to hear a talk by Marine Corporal Edward F. Long of Chicago who wears a presidential citation for gallantry, the Purple Heart and other medals and ribbons.

The Marine described his participation in the battle of Midway and the fight at Guadalcanal, and ended his talk with a plea for less absenteeism and more effort to keep the fighting men supplied and equipped.

Ray Long, a disabled seaman of the navy, who took part in the North African invasion, also related his experiences, and asked for complete cooperation of the workers, saying, "Don't send us your husbands, your brothers, your sweethearts and your sons without giving them enough equipment."

Official navy motion pictures of the battle of Midway were also shown.

Explains Possibilities of Pluswood

Enormous possibilities of pluswood, a new product being manufactured by Pluswood, Inc., Oshkosh, Wis., were described by Alexander Bukolt, general manager, in an address last week to the Kiwanis club of Neenah, Wis.

Mr. Bukolt explained that the product is a resin impregnation of wood combined with enormous heat and pressure. It makes a material stronger, lighter and more fire-resistant than steel, he said, actual demonstating with samples that it takes 7 seconds longer to burn a hole through Pluswood than it does a plate of steel with an acetylene torch. Likewise the wood will not swell and shrink, as the resin locks the wood into shape. It can be used to make gears, aircraft propellers, bearings, furniture, shoe lasts, venetian blinds, shuttles for textile industries and countless other articles.

The company has the largest press in this country, three stories high, weighing 600,000 pounds. It has pressure in millions of pounds. It also has the largest electrostatic generator ever built, to provide the enormous heat needed.

H. C. Manecke Announces Retirement

Henry C. Manecke announced his retirement last week as assistant manager and secretary-treasurer of the Wausau Iron Works, Wausau, Wis. He had served the company for 31 years, beginning with the firm almost since its founding in 1908. He became a stockholder in 1921, and assistant manager in 1940. No successor has been named by John J. Heinzen, president.

Women Mill Workers Play Golf

Forty women of Kimberly-Clark Corporation, Neenah, Wis., held their annual golf jamboree and dinner party Sunday, August 15, at Ridgeway Golf Club. Miss Anita Peters won the low score on nine holes, and Miss Donnie Brown on eight holes. Numerous other prizes were awarded. These golfers will now be paired for the Kimberly-Clark Women's Golf Tournament.

Menasha Announces Sales Changes

Several changes in Menasha sales personnel were recently announced by A. W. Stompe, sales manager of the Menasha Products Company, Menasha, Wisconsin.

Willard Charles, Menasha representative in Pittsburgh, was inducted into the armed forces in July and Gordon Becker, who formerly represented the company in St. Louis is being transferred to Pittsburgh. Harry Smart, formerly of the Indianapolis territory will take over the St. Louis territoy and Lowell Nichols, a new Menasha salesman, will have charge of the Indianapolis territory.

During July and August sixteen Menasha sales representatives attended a midsummer sales conference at the Home Office, Mr. Stompe reported. The purpose of the meeting was to give salesmen current information on the problems of wartime production and service which will equip them for better wartime service to Menasha customers.

A.P.P.A. Gives Action Program for Industry

E. W. Tinker, Secretary of American Paper and Pulp Association, Prepares Summary of Condition With Particular Reference To Pulpwood—Will Make Statement To War Manpower Commission.

Unless immediate and effective setps are taken the economy of the United States will be gravely affected by a drastic shortage of paper. Paper production is dependent on wood pulp production and wood pulp production is dependent upon pulpwood production.

Receipts of pulpwood during the first six months of 1943 were 24 per cent (2,100,000 cords) or less, than for the same period in 1942. Mill inventories of wood declined by 32 per cent (1,100,000 cords) during this period. By the end of June unfilled orders for paper and paperboard had reached nearly 1,200,000 tons.

Wood pulp production during the first six months of 1943 amounted to 4,550,000 tons compared with 5,521,000 tons in the first six months of 1942. This represents a falling off in wood pulp production of almost 1,000,000 tons or a decrease of 17.5 per cent. Inventories of wood pulp now stand at the lowest point of record.

Basic to the drain on wood pulp inventories is the existing and potential shortage of pulpwood. With the exception of the South and to a degree the Pacific Northwest, pulp production, which means paper production, is dependent upon pulpwood cutting six months to one year in advance. If pulpwood cutting in the Northeast and Lake States is not initiated and fully manned and equipped within the next eight weeks pulp production from these areas will probably not exceed 60 per cent of normal in 1944.

In the Southern region wood production and use are possible and necessary on a current basis. Existing shortages are affecting the production of vitally needed strong fibre pulp to a point that war and other requirements are already being seriously affected.

In the Pacific Northwest the great market pulp mills are either idle or operating at low production rates that permit them to hold an operating crew only with difficulty. In the meantime, the mills dependent upon purchased pulp face economic annihilation and the Nation faces a paper shortage that will stagger the war and civilian economy.

Only by the adoption and enactment of a specific plan of action, region by region, can the situation be saved. The following steps have already been taken:

1. Pulpwood cutting has been declared an essential activity by the War Manpower Commission. Employment offices and draft boards have been notified.
2. $1,000,000 has been appropriated by Congress to expedite the production of forest products.
3. A Deputy Administrator in the Pulp and Paper Branch of the War Production Board, whose sole responsibility will be pulpwood production, has been appointed.
4. The industry has initiated, in cooperation with publishers, an extensive campaign to encourage pulpwood production.

The pulp and paper industry submits the following plan based upon facts and experience:

National Requirements

1. The situation with respect to pulpwood is so acute that the War Manpower Commission is fully justified in placing woods labor cutting pulpwood on the same basis as agricultural labor. This will require a uniform and coordinated program directed to all employment offices and draft boards.

2. Office of Price Administration action on price questions affecting pulpwood production should be immediate and with due consideration to the effect upon production. Action by the Office of Price Administration should be coordinated with objectives of the War Production Board. Field men of both agencies should consider conjunctively local price questions as they arise and prompt action on their recommendations must be had in Washington.

Coordination of policy and action between the lumber and the pulp and paper divisions of both OPA and WPB is essential. Conditions and requirements change and the public welfare and the prosecution of the war is not promoted by competition between and within public agencies. The necessities of the situation should control.

3. Industry recommendations looking to conservation of fiber should be approved at once. These recommendations were formulated after long and careful consideration. They cover the major tonnage items in the industry and have long awaited action.

4. Usable labor obtainable from new sources such as prisoners of war, imported labor and evacuees eligible for relocation should be made available where conditions permit their use, and forestry battalions of the U. S. Army should immediately be formed and established. The situation justifies the transfer of experienced wood cutters from other industries and, in addition, furloughs from the Army of this class of labor should be provided.

5. Action to encourage increased forest products production implemented by the appropriation of $1,000,000 for this purpose by the Congress should stress pulpwood production—a product particularly adapted to farm labor and equipment.

6. Every necessary step to facilitate the importation of pulpwood, particularly from Russia, should be taken.

Northeastern Region

1. Northeastern pulpwood production has over a long period of years been predicated upon the availability of from seven to nine thousand seasonal woods laborers from Canada. With the growing shortage of labor in Canada, the number available has been progressively reduced. In addition, as the situation has become increasingly acute on the American side of the line, those available have been sought and granted to new industries not traditionally accustomed to their use. This situation, added to the acute local shortage, is without precedent and if not remedied will be ruinous. The cut in the number of Canadian laborers available for use in the United States should not exceed proportionate cuts required in the Canadian industry. Regional conditions in Canada and the United States may require special considerations.

2. Traditionally, Northeastern mills, either through

ownership of forest lands or through contractual arrangements, have been dependent on wood imported from Canada. A definite policy and plan should be developed with the Canadian Government which will assure the continuation of such imports to the maximum degree. The past practice of belated action followed by hurried consideration should be superseded by a fixed policy and plan.

3. The possibilities of securing Newfoundland labor should be explored.

4. Because of the combination of circumstances involving the curtailment of available Canadian labor and domestic shortages of labor, definite recruitment plans should be immediately developed and prosecuted by employment offices in cooperation with the companies concerned, and implemented by specific instructions from the War Manpower Commission.

Southern Region

1. Absenteeism on the part of woods workers is the largest factor in causing the existing acute shortage of wood supplies in the South. This condition in other industries has been to a considerable degree cured through effective action on the part of the War Manpower Commission. A definite plan of action should be developed and effectuated that will reach the southern woods worker in a way that he will understand.

2. Recruitment action similar to that suggested for employment offices in the Northeastern Region should be applied in the Southern Region.

Lake States Region

1. The woods labor force of the Northern Lake States has to a large extent disappeared because of repeated recruitment for projects in other regions or more lucrative local or regional employment. It is now necessay that this program be reversed. Otherwise pulpwood and consequently pulp production will continue to decline.

2. Large importations of Canadian wood have been customary in this region. The same action prescribed for New England is necessary.

Pacific Northwest

1. Increased log production must be obtained. This means that skilled woods workers must be returned to the woods where their skills can be applied to the maximum contribution in our national economy.

2. In the allocation of logs provision must be made for sufficient supplies to operate existing pulp mills. Species customarily used for pulp production are not normally in economic competition with other uses. These logs should be returned to their highest economic use.

3. There should be established a parity basis between British Columbia pulp mills and American mills. The log supply available to both should be considered a pool and allocated to maintain maximum pulp production.

Edward Bailey Resigns

After a quarter of a century of sales activity in the New York Office of the Hollingsworth & Whitney Company, Edward Bailey announces his resignation.

While he has no immediate plans for the future, after a vacation, it is his expectation to continue in the mill end of the business where he has had considerable experience in the East and Pacific Coast areas.

WPB to Spur Pulpwood Output

Government efforts to increase production of pulpwood and to synchronize distribution controls over all branches of the industry—from lumber down to finished paper products—have been concentrated in the hands of Harold Boeschenstein, director, production controls bureau of WPB, a press dispatch stated late last week.

Mr. Boeschenstein will act as pulp and paper coordinator with the primary purpose of determining policies to be followed. He will co-ordinate the functions of three WPB divisions: pulp and paper, containers and printing and publishing. In addition, he will establish close liaison with the War Manpower Commission, OPA and Canadian authorities.

Since no immediate relief can be expected in the pulpwood situation, curbs on the use of pulp and paper may have to be tightened further, it was stated. To make available supplies go as far as possible, a tougher attitude on inventories will be taken by WPB.

WPB is working closely with WMC in an attempt to find manpower for the cutting of wood. As far as Canada is concerned, one particular problem lies in the fact that the deferment from military service applies to farmers but not to woodcutters. Since much of the woodcutting is being done on a seasonal basis by farmers, they have been reluctant to go into the woods this year because they were afraid to lose their deferment status as farmers.

Mill Campaign for Pulpwood

A mill advertising portfolio prepared to help mills develop their own pulpwood promotion campaign, has been issued by the War Activities Committee of the Pulpwood Consuming Industries, Frank Block, director, 1433 R.C.A. Building, New York 20.

The portfolio includes a discussion of yhy a pulpwood campaign is necessary, and how newspapers, magazines and individual mills may best cooperate to make the drive for a larger pulpwood supply a success.

The material supplied is especially prepared for display advertising use. To obtain the best results it is important for pulp mills to cooperate with their local newspapers in placing tie-in advertisements and seeing that every paper in mill areas have all the personal assistance required.

Campaign material is supplied by the committee, postpaid, without charge.

Statler Tissue Co. Gets Consent Order

The War Production Board Regional Office in Boston has announced a consent order against Myer and A. H. Ginsburg, doing business as co-partners under the firm names and styles of Statler Toilet Tissue Company and M. A. King Company, 32 McGrath Highway, Somerville, Mass., for violating WPB order M-241-a by consuming in the manufacture of paper towels during the first calendar quarter of 1943, 251 tons of paper above the amount permitted by the order.

The co-partners admit the violations but deny that it was wilful, and have agreed to the issuance of a consent order which requires them to reduce the consumption of paper for towels as allowed under M-241-a by the amount of 376 tons during the third and fourth quarters of 1943.

The ***UFORMITES*** meet Army and Navy specifications

WHEN there's fighting to be done . . . TNT and water don't mix. That's why weather-proof paperboard containers are being used in the shipment of this vital war material.

No New Equipment Needed

Using the UFORMITES . . . urea formaldehyde type resins supplied in liquid or dry powder form . . . you can manufacture both corrugated and solid fibre board meeting Army and Navy specifications for weather-proof containers. You need no special equipment . . . need make no great change in production procedure.

Years of Research

Developed by The Resinous Products & Chemical Company, these synthetic resins are a natural outgrowth of years of research and manufacture of resin adhesives being used today in plywood airplanes, gliders and landing barges.

Send for Data

Get the complete facts about the UFORMITES. Write today for technical literature and samples.

THE UFORMITES FOR PAPER TREATMENT

UFORMITE 430 and UFORMITE 500 for resin fortified glues for manufacture of weather-proof corrugated and solid fibre shipping cases.

UFORMITE 466, a low-cost urea formaldehyde type resin designed for increasing wet-strength by simply adding to the beater or the head box.

UFORMITE 449 for improving wet-strength of paper, through tub sizing operations.

UFORMITE 412-A, a urea formaldehyde resin for laminating work.

THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA, PA.

Committee Visits Canadian Newsprint Mills

House Group Investigating Newsprint Shortage Is Well Impressed With Plants—Tour Expected To Include Vancouver—Key To Adequate Supply Cited As Manpower With 20,000 More Men Needed.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., August 23, 1943—The sub-committee of the U. S. House of Representatives which has been investigating the newsprint shortage here have had a busy time touring the centers of newsprint production in the province of Quebec. Spokesmen for the group have expressed amazement at the development of the industry here and have remarked particularly on the fine character of the plants in the valley of the St. Maurice. They have been impressed also by the accessibility of the plants to large requirements of electrical power and also to the close relationship on the rivers to their own pulp limits. One result also has been to convince them that the main problem in getting enough newsprint is to get enough men into the woods to get out sufficient pulpwood to meet the requirements of the mills.

Representative Wolverton Issues Statement

When the sub-committee was at Kenogami, in the Lake St. John district, one of its members, Charles Wolverton (Rep., N. J.) gave out an interview which has attracted much attention. He expressed the belief that if Canada fails to supply the needs of American newspapers the United States may have to find substitute sources of paper.

"If relief is not given, increased output in the United States and use of substitutes may seriously interfere with the future of the paper industry in Canada," he said.

The committee has found the paper scarcity reflects pulpwood shortage estimated at 2,500,000 cords this year in the United States and 1,750,000 cords in Canada.

To pad out United States pulpwood supplies, American mills are obtaining from Canada more than 100,000 tons of wood pulp a month, or the equivalent of more than half the total Canadian newsprint shipment to the United States.

Committee chairman Lyle H. Boren (Dem., Okla.) said paper men in the United States are studying cotton stalks as among the possible substitutes for wood in the manufacture of paper.

Wolverton said it would be pointed out to officials in Ottawa, where the committee will confer with government representatives, that the pulp and paper industry is important to war.

"It is Canada's largest industry from the standpoint of employment, wages paid, goods purchased, fuel, power and in its relationship to exchange between Canada and the United States," he continued.

He said "any policy of further curtailment in consumption of newsprint at the present time is wrong."

Manpower in Woods Abnormally Low

The key barrier to increased output of pulpwood necessary to maintain paper production is manpower, according to the sub-committee's findings, and they also found that in the estimate of newsprint company executives an additional 20,000 men could put supplies back to normal. In regard to this Mr. Wolverton pointed out that Canada has in the army a "home guard" of 500,000 men and said: "Such a large body of men could be the source of labor supply if Canadian officials could be convinced of the seriousness of the situation." He suggested that in both Canada and the United States a reassessment of the manpower supply in several large industries might uncover excesses which could be diverted into pulpwood areas. The United States industry also has asked for 20,000 additional workers and has offered to use prisoners of war.

Party to Visit Other Newsprint Mills

The party returned to Montreal during the past weekend and left immediately for an inspection of newsprint plants in Ontario. From Ontario they will proceed directly west to visit mills and timber limits around Vancouver, B. C., before returning to the United States by way of Seattle and Portland, Ore.

The personnel of the party included Reps. Lyle H. Boren, committee chairman; Lindley Beckworth (Dem. Texas); R. F. Harkness (Dem., Ariz.); Clarence J. Brown (Rep., Ohio); Charles Wolverton (Rep., N. J.); Elton J. Layton, clerk of the committee; O. T. Smith, official reporter; G. H. Fisk, assistant to the newsprint administrator of Canada's Wartime Prices and Trade Board, who is traveling with the group; and reporters for the Associated Press and United Press. Two membes of the seven-man committee were unable to make the trip.

Changes Labeling of Some Papers

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., August 25, 1943—Modification of the grade labeling provision in Maximum Price Regulation No. 400 (Merchants' Prices For Fine Papers and Certain Paperboards) has been announced by OPA.

Heretofore on sales of job lots and second quality papers, merchants were required to specify the quality involved both in their invoices and on the wrapping of the paper.

In Amendment No. 1 to Maximum Price Regulation No. 400, effective August 19, 1943, OPA specifies that the statement of quality may be made on either the invoice or the wrapping, at the merchant's option. This carries out the intention of the Taft amendment to the Emergency Price Control Act.

The amendment to MPR 400 also exempts from the regulation certain sales by fine paper merchants generally considered in the trade as manufacturers' sales. These are sales where the manufacturer of the paper sells through a paper merchant for resale to a specific purchaser, provided that the manufacturer is directly involved in the determination of the final price to the purchaser and the merchant's sole compensation for his service is in the form of a selling discount, commission or fee. Sales of this type frequently occur where the ultimate purchaser is a Government agency or a large contract buyer. Sales of paperboard are not affected by this change.

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending August 21, 1943

STOCKS

	High	Low	Last
A. P. W.	2	2	2
Armstrong Cork Co.	36¼	34¾	36½
Celotex Corp.	13⅛	13⅛	13¼
Celotex Corp., pf.	19¼	19	19
Certain-Teed Products Corp.	6⅛	5¾	5¾
Certain-Teed Products Corp., pf.	58	55½	56
Champion Paper & Fibre Co.	....	....	....
Champion Paper & Fibre Co., pf.	107½	107	107
Congoleum Nairn Co.	23⅛	22	22
Container Corp. of America	20¼	19¾	19¾
Continental-Diamond Fibre Co.	12½	11⅞	11⅞
Crown Zellerbach Co.	15¾	15¼	15¼
Crown Zellerbach Co., pf.	98¾	98½	98⅝
Dixie Cup Co.	14	13	13
Dixie Cup Co.—A	44	43¾	44
Flintkote Co.	19⅞	19¼	19⅜
Flintkote Co., pf.	106¾	106	106¾
Robert Gair	3	2¾	2¾
Robert Gair, pf.	12¾	12¾	12¾
International Paper Co.	11⅛	10⅝	10⅝
International Paper Co., pf.	59¾	58½	58¾
Johns-Manville Corp.	85¾	85	85½
Johns-Manville Corp., pf.	132	132	132
Kimberly-Clark Corp.	31⅜	31⅜	31⅜
MacAndrews & Forbes	25¾	25⅛	25½
MacAndrews & Forbes, pf.	....	....	....
Mansonite Corp.	38¼	38	38
Mead Corp.	8¼	8⅛	8¼
Mead Corp., pf. A—6%	85	84	84
Mead Corp., pf. B—5½	76	76	76
Paraffine Companies, Inc.	41½	41½	41½
Paraffine Companies, Inc., pf.	....	....	....
Rayonier, Inc.	14⅜	14⅛	14⅛
Rayonier, Inc., pf.	31	30½	31
Ruberoid Co.	27⅜	26½	27⅜
Scott Paper Co.	42	42	42
Scott Paper Co., pf.	112	112	112
Sutherland Paper Co.	....	....	....
Union Bag & Paper Corp.	9⅜	9½	9½
United Paperboard Co.	4½	4⅜	4⅜
U. S. Gypsum Co.	70¾	69	70
U. S. Gypsum Co., pf.	....	....	....
West Virginia Pulp & Paper Co.	15	14¾	15
West Virginia Pulp & Paper Co., pf.	107⅛	107	107⅛

BONDS

Abitibi Pulp & Paper Co. 5s '53	....	....	....
Celotex Corp. 4½s '47	101⅛	101⅛	101⅛
Certain-Teed Products Corp. 5½s '48	101⅜	101¼	101⅜
Champion Paper & Fibre Co. 4¾s '50	....	....	....
International Paper Co. 6s '55	107	106	106⅛
International Paper Co. 5s '47	104½	104⅛	104⅜
Mead Corp. 3½s '53	....	....	....
West Virginia Pulp & Paper Co. 3s '54	104	104	104

New York Curb Exchange

High, Low and Last for Week Ending August 21, 1943

STOCKS

	High	Low	Last
American Box Board Co.	7⅛	7⅛	7⅛
Brown Co., pf.	....	....	....
Great Northern Paper Co.	33	32	32
Hummel-Ross Fibre Corp.	4½	4½	4½
National Container Corp.	14	13¾	13¾
St. Regis Paper Co.	3½	3⅜	3⅜
St. Regis Paper Co., pf.	138	135¼	138
Taggart Corp.	3¼	3¼	3¼

BONDS

American Writing Paper Co. 6s '61	95	94	94

Union Bag Earns 36 Cents

Net income of the Union Bag and Paper Corporation for the quarter ended June 30, 1943, after provision for federal taxes based on the net income for that quarter less the deficit of the first quarter, amounted to $452,362 or 36 cents a share on the outstanding capital stock. This compares with $423,436 or 33 cents a share for the corresponding quarter of last year, and with a deficit of $188,074 in the first quarter of 1943.

Net income in the six months' period ended June 30, 1943, totaled $264,289 or 21 cents a share compared with $1,042,640 or 82 cents a share in the comparable period a year ago. Comparative earnings for the periods in 1942 are adjusted to the tax rates under the revenue act of 1942.

Sales for the second quarter amounted to $7,920,417, an increase of 11.8 per cent over the $7,082,978 in the second quarter of last year, and 4.7 per cent over the $7,562,428 in the first quarter of this year. Sales for the first six months of $15,482,845 reflect a decrease of 2.6 per cent from the $15,888,430 sales in the comparable period a year ago.

Alexander Calder, president of the Union Bag and Paper Corporation, in discussing the report, states that absenteeism, the manpower shortage and the scarcity of pulpwood are curtailing the volume of production and shipments, which further increases costs and reduces profits.

Puget Sound Nets 62 Cents

The Puget Sound Pulp and Timber Company reports net profit of $236,598, or 62 cents per common share, for the first six months of 1943, after provision of $292,569 for Federal taxes. Net profit in the first half of 1942 was $454,579, or $1.29 per common share, after Federal tax provision of $1,190,849.

While operations are still considerably below plant capacity, due to the deterrent effect on log production of manpower shortage, visible improvement occurred in the second quarter of 1943.

Pulp production of 25,698 tons in the second quarter compared with 21,181 tons in the first quarter. Profit before tax provisions amounted to $286,764 in the second quarter, in comparison with $242,403 in the first quarter.

Net after tax was $126,051 in the second quarter and $110,547 in the first quarter.

Kimberly-Clark Vote Dividend

An extra dividend of 25 cents in addition to the usual quarterly of 25 cents on the common stock has been declared by directors of the Kimberly-Clark Corporation. This is the first extra dividend since December, 1942.

Whitaker Profits Up

The Whitaker Paper Company for the six months to June 30, reports a net income of $163,582, equal to $4.54 each on 30,188 common shares, compared with $120,097, or $3.08 a share, last year.

Hummel-Ross Earns 42 Cents

The Hummel-Ross Fibre Corporation for the twenty-eight weeks to July 10, reports unaudited net profit was $187,983, or 42 cents each on 391,706 shares. No comparison is available.

West Virginia Votes Dividend

The West Virginia Pulp and Paper Company has declared a common dividend of 30 cents. Previous payments this year were 15 cents each in January, April and July.

Program for Army and Navy Requirements Conference at Chicago

The following is the program for the Army and Navy Requirements Conference sponsored by the Technical Association of the Pulp and Paper Industry to be held at the Palmer House, Chicago, September 21 to 24 inclusive:—

Tuesday, September 21

9:30 A. M. UNITED STATES NAVY SESSION, Arranged by Lt. (j.g.) Winfield Scott Hassler. R. A. Hayward, Chairman.

1. Opening Remarks by Rear Admiral W. B. Young, Chief, Bureau of Supplies and Accounts, U. S. N.
2. Navy Packaging and Packing by Lt. Comdr. O. P. Lattu, Containers Section.
3. Navy's Packaging Problems (Results of Field Survey in South Pacific) by Lt. C. S. MacNair and P. P. Kennedy, Containers Section.
4. Packaging Materials Required for Preservation by Lt. (j.g.) D. R. Weedon, Jr., Philadelphia Naval Aircraft Factory.
5. How to do Business with the Navy by Lt. (j.g.) Robert Faegre.
6. Paper and Container Conservation and Reclamation by Frederick G. Barber, Containers Section.

2:00 P. M. UNITED STATES ARMY SESSION, Arranged by Major Malcolm J. Odell, ASF. R. A. Hayward, Chairman.

1. What Can the Quartermaster Corps Expect from Paper Products in Regard to: 1. Water Vapor Permeability; 2. Insect Barriers; 3. Imperviousness to Inert Gases; 4. Lower Limits of the TAPPI Greaseproof Test; 5. Qualitative and Quantitative Controls for Laminants; 6. Use of Asphalt to Obtain Water Vaporproofness, Retaining Flexibility at Low Temperatures; 7. Plastic Coated and Impregnated Papers; and 8. High Wet Strength Papers by Capt. W. C. Lock, Packaging Section, Research and Development Branch, Office of the Quartermaster General.
2. An Analysis of the Application of Paper Products to CWS Packaging by Capt. G. H. Danks, Technical Division, Chemical Warfare Service.
3. Marking Army Shipments by Capt. George Wallerschein, Packing and Marking Branch, Port and Field Agencies Division, Office of the Chief of Transportation.
4. Requirements of Protective Papers for Ordnance Overseas Packaging (A Presentation of the Problems that Must be Met in Developing Satisfactory Noncritical Water Vaporproof Barriers, Greaseproof Wrappers and Bag Liners) by H. T. Holbrook and A. L. Whiton, Packaging Staff, Field Service Division, Office of the Chief of Ordnance.
5. Problems in the Packaging of Signal Equipment (An Analysis of the Problems Confronting the Signal Corps, Particularly With the Cushioning and Packaging of Delicate Radio Equipment and Transmitter Tubes, The Use of Molded Pulp Containers and the Use of the Services of Technical Consultants of the Industry in Manufacturers Plants) by Major J. J. Healy, Chief, Storage Branch, Distribution Division, Office of the Chief Signal Officer.
6. What Can the Engineers Expect of Paper Packaging for Overseas Shipments (Insulation Board, Camouflage Nets, Cement, Fireclay, Bituminous Products, Surveyors' Instruments, Sensitized Papers and Water-Vapor Resistant Barriers) by Major John C. Babson, Chief, Inspection Division, Procurement Branch Office of the Chief of Engineers.
7. Packaging Medical Supplies for the Army (An Analysis of Medical Department Packaging Problems Offering Opportunities for Technical Improvement of Paper Packaging Materials) by James D. Studley, Packing Section, Storage Branch, Office of the Surgeon General.

8:00 P. M. FORT DEARBORN PARTY, An Evening of Entertainment and Good Fellowship Being Arranged in Cooperation With the Chicago Paper and Twine Club.

Wednesday, September 22

9:00 A. M. ORDNANCE PACKAGING SESSION, J. D. Malcolmson, Chairman.

1. Hazards Involved in Shipping War Material by G. A. Garratt, Chief, Division of Technical Service Training, Forest Products Laboratory, Madison, Wis.
2. The Corrosion Problem and How It May Be Met by H. B. McKean.
3. The Army and Navy Requirements in Reference to the Role of Paperboard in Shipping Material by R. A. Cockrell.
4. Container Testing Methods by C. E. Hrubesky, Pulp and Paper Division, Forest Products Laboratory.

9:30 A. M. COATING ROUND TABLE. Walter M. Bain, Chairman. Discussion of Adhesives.

9:30 A. M. ACID PULPING ROUND TABLE. George H. McGregor, Chairman.

1. A Study of the Hoeppler Viscosimeter for the Determination of the Cuprammonium Viscosity of Cellulose by C. E. Brandon and W. O. Hisey, New York State College of Forestry, Syracuse, N. Y.
2. The Nature of Lignosulphonic Acids Fractionated by Chemical and Physical Methods by W. Allan Schenk, Institute of Paper Chemistry, Appleton, Wis.—By title.
3. Discussion of Lignin Plastics.
4. Discussion of Waste Utilization.

12:30 P. M. LUNCHEON. Walter C. Daley, Chairman. Speaker to be Announced.

2:00 P. M. ARMY, NAVY AND W. P. B. SESSION. Harry E. Weston, Chairman.

1. Substitution and Conservation — The Role of Paper in the War by R. J. Zaumeyer, New Products Development Section, Pulp and Paper Division, War Production Board, Washington, D. C.
2. Army and Navy Panel. The program of Tuesday, September 21st, having been devoted to a presentation of the paper and packaging prob-

lems of the Army and the Navy, the balance of this program will be devoted to a general discussion of the subjects covered. Questions and Suggestions should be written out and turned in at the registration desk prior to this session.

2:00 P. M. GENERAL SESSION. Vance P. Edwardes, Chairman.

1. Photomicrographs by Projection by Jules J. Perot, Jr. and Charles G. Schultz, Rhinelander Paper Company, Rhinelander, Wis.
2. Paper Problems in Telephone Apparatus by David A. McLean, Bell Telephone Laboratories, New York, N. Y.
3. Radio Frequency Heating of Non-metallic Materials by G. C. Nonken, General Electric Company, Pittsfield, Mass.
4. The Number of Fibers per Gram of Pulp and Its Relation to Fiber Dimensions by John H. Graff, Institute of Paper Chemistry, Appleton, Wis.

2:00 P. M. PAPERMAKING ROUND TABLE. A. E. Bachmann, Chairman.

1. Discussion of the Hydraulic Principles Relating to the Cylinder Machine as Presented by J. B. Gough at the TAPPI Annual Meeting in February (See current Technical Association Paper).

2:00 P. M. ALKALINE PULPING ROUND TABLE. Paul Hodges Chairman.

Discussion of Sulphate Soap Terminology.

1. The Pulping of Extracted Yellow Pine Wood Chips by Otto Kress and Robert H. Mosher, Institute of Paper Chemistry—By title.
2. A Comparison of Southern and Northern Kraft Pulps by Otto Kress and Francis T. Ratliff, Institute of Paper Chemistry—By title.

Note: During the morning and afternoon, groups not exceeding 50 will be taken to the printing plants of W. F. Hall Printing Company and R. R. Donnelly to inspect operations.

4:00 P. M. Visitors will be welcome to visit the printing plant of the Chicago Tribune.

8:30 P. M. *Radio Broadcast* by the Northerners.

Thursday, September 23

9:00 A. M. GENERAL SESSION. Pierre Drewsen, Chairman.

1. Application of Uformite 466 by Robert E. Myers, The Resinous Products and Chemical Company, Philadelphia, Pa.
2. Mersize, A New Engine Size-Principles and Application by W. S. Wilson and H. E. Duston, Merrimac Division, Monsanto Chemical Company, Everett, Mass.
3. Apparatus for Measuring Gas Transmission Through Sheets and Fiber by H. R. Todd, American Can Company, Maywood, Ill.
4. Acclimatization of Bacteria to Disinfectants Used in the Paper and Paperboard Industry by John W. Appling and B. F. Shema, Institute of Paper Chemistry, Appleton, Wis.
5. Possible Stream Pollutional Aspects of Mill Antiseptics by Willis M. Van Horn, Institute of Paper Chemistry.

9:30 A. M. CONTAINER TESTING COMMITTEE MEETING. A. W. Nickerson, Chairman.

12:30 P. M. LUNCHEON. A. E. Montgomery, Chairman. Speaker to be Announced.

2:00 P. M. WATER VAPOR PERMEABILITY TESTING SESSION. W. H. Graebner, Chairman.

(Continued on page 36)

We're in it for the duration

SINCE 1828

We have served the industry well, with the finest in Paper Mill Machinery.

NOW

our entire manufacturing facilities are engaged in turning out material for the mightiest and most formidable fighting machine our country has ever known.

While we cannot give you typical peacetime SW Service, we can supply you with replacements — under proper priority rating, of course.

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MANUFACTURING COMPANY

PLANT AND OFFICES AT SOUTH WINDHAM, CONNECTICUT

Form Container Institute

With a view to simplifying and standardizing the products they are making for the Government, a group of specialty bag manufacturers met August 19 in New York and formed the Specialty Flexible Container Manufacturers Institute, which will act as a fact-finding body. The group, which met in the Hotel Waldorf-Astoria, elected Gordon Friend of the Thomas Royal Company, Philadelphia, president. It is expected that about 100 manufacturers will become members of the institute.

Alfred Bleyer of Alfred Bleyer Company, Brooklyn, was elected vice president. Four committees were set up to represent divisions of the industry, and the chairmen named were as follows: Transparent division, William Morre of the Shellmar Products Company, Chicago; glassine and specialty division, Irving Zucker of the Oneida Paper Products Company, New York; coffee bag division, H. W. Stevens of the Benj. C. Betner Company, Devon, Pa., and the hand-made and special division, C. A. Thomas of the Kennedy Car Liner and Bag Company, Shelbyville, Ind. Stephen B. Vreeland was appointed counsel.

Simplified Weights and Counts

Simplification of weights and sizes in the paper industry has been under more or less serious consideration for some years. The subject has, from time to time, come up at the meetings of the Salesmen's Association of the Paper Industry. With the establishment of a wartime economy the subject becomes of increased importance.

In a booklet issued by the Fletcher Paper Company, Alpena, Mich., under the title of "Proposed simplified basis weights and counts for the paper industry," the problems are discussed.

The 1,000 sheet count, the booklet explains, is most practical. The United States Government uses it and printing, envelopes and many converted paper products are sold on the units of 1,000.

For example, instead of using 17x22 or 374 square inches, 24x36 or 864 square inches, etc., simplification is effected by reducing all basis sizes to one common denominator of 25x40 inches or 1,000 square inches.

The booklet discusses in some detail the advantages of the proposed simplification plan and includes tables of paper basis weights and basis weights of the various associations, listed by grades.

Fox Paper Co. Gets Army-Navy E

The Army-Navy "E" award was recently presented to the Lockland plant of the Fox Paper Company at Lockland, Ohio.

The invocation was delivered by Rabbi Michael Aaronsohn, national chaplain of Veterans of Foreign Wars. The Honorable James Garfield Stewart, mayor of Cincinnati, was master of ceremonies. General Wm. H. Tunner, Commanding General, Ferrying Division, Air Transport Command, U. S. Army, presented the award pennant which was accepted by Harold W. Nichols, president, Fox Paper Company. The U. S. Army Color Guard, Patterson Field, raised the "E" pennant. Commander G. H. Bowman, U. S. N. retired, presented the "E" pins which were attached by Private Rex Harrison, U. S. A. wounded veteran North African campaign. The "E" pins were accepted by George Ewen, 43 years service; Caroline Asbrock, Stella Wynn, Golden Cummins, Bernard H. Kramer and William T. Brackett.

Walter Stillman Haley Dead

Walter Stillman Haley, 77, well known retired pulp expert, died Friday, August 6, at his home in Lincoln, N. H., of complications following an illness of five years.

Mr. Haley was born May 1, 1866, at Winchendon, Mass., the son of Morris and Rebecca Haley of that place, He lived as a child in Winchendon and in Tabor, Iowa, graduating from the French Business college in Boston.

Mr. Haley entered the pulp industry in 1890 when he obtained a minor position with the Eastern Manufacturing company of South Brewer, Me., and was employed in that industry with increasing responsible positions until his retirement five years ago.

He served as pulp mill superintendent for the Eastern Manufacturing company in South Brewer, Me.; in the Oregon City plant of the Crown-Willamette company of the West Coast; for the Marinette Pulp and Paper company in Marinette Wis.; and for the Parker-Young company in Lincoln.

He was also employed for several years as a pulp expert by E. R. Barker of Boston, Mass., and in that capacity installed the Barker Acid System in mills all over the country and became well known as a pulp expert. Mr. Haley was of an inventive mind and originated a number of improvements in the sulphite process which are in use in mills all over the country. His latest invention only a few years ago was the Haley-Hardy valve which was patented and is sold by the William A. Hardy & Sons company of Fitchburg, Mass.

Mr. and Mrs. Haley have been residents of Lincoln since Mr. Haley accepted the position there in September of 1921. On September 29, 1941, they celebrated their 50th wedding anniversary.

Mr. Haley was a member of the Euclid lodge, A. F. and A. M., of Madison, Me., and also of the I. O. O. F. of Brewer, Me.

To be New York Sales Manager

Hollingsworth & Whitney Company announces from its office at 60 Batterymarch street, Boston, that Jack B. Cowie has been appointed New York sales manager.

Mr. Cowie entered the paper business in 1919 with Orono Pulp and Paper Company and after two years spent at the mill began to travel for them covering all of the states east of the Mississippi and some western territory including Texas. He resigned from Orono Pulp and Paper Company at the time of their merger with Eastern Manufacturing Company in April, 1930. He became connected with Hollingsworth & Whitney Company at their New York office in April, 1930. In 1935 he was appointed manager of wrapping papers and in February, 1942, he was made manager of paper shipping sacks.

Excello Paper Products Co. Formed

[FROM OUR REGULAR CORRESPONDENT]

CINCINNATI, Ohio, August 23, 1943—Papers of incorporation filed at Columbus included the Excello Paper Products Company, Cincinnati, with 3,000 shares of no par value stock. Incorporators were listed as James B. O'Connell, Albert D. Cash and John R. Hahn, represented by the law firm of Dolle, O'Donnell and Cash, Carew Tower.

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in the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, New Jersey, Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia and Florida.

● Developed specially by Armstrong for paper dryer roll service, these traps have extra air elimination capacity in addition to their regular function of removing condensate without steam loss. Results are higher production and lower costs, through faster heating, better quality paper and fuel savings. Users say there is nothing like this trap for dryer roll service.

Other production aids for paper industries: Armstrong compound traps for digesters; evaporators, etc. . . . forged steel traps for high pressure power plant service . . . and regular traps for heaters, cooking tanks, space heating coils, unit heaters and other equipment.

INVALUABLE FOR YOUR FILES—write for copy of Armstrong Trap Book, illustrating construction, operation and application details.

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Specific Ceiling Prices Given on Book Paper

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., August 25, 1943—Manufacturers of book paper were given specific ceiling prices and pricing methods by the Office of Price Administration today.

Formerly, under the General Maximum Price Regulation, each manufacturer determined his own ceilings on the basis of the highest prices charged by him during March, 1942.

Now, all manufacturers will find specific dollars-and-cents ceilings or methods for determining ceilings in a new regulation, Maximum Price Regulation No. 451 (Book Paper), which is effective August 25, 1943.

This new regulation groups all sales of manufacturers under the following two main headings:

(1) Spot sales to merchants and all sales to the United States Government or its agencies.

(2) All other sales, including spot sales to other than merchants and all contract sales except those to the United States Government or its agencies.

In the first category dollars-and-cents ceilings are provided for 14 standard grades of book paper. Other grades have ceilings based on differentials as between them and the standard grades. Still others which cannot be priced by differential are frozen as of the base period October 1, 1941, through March 31, 1942.

In the second category all ceilings are at the highest prices charged by the seller during the base period on sales of like quantities to purchasers in the same line of business as specifically defined in the regulation.

Today's action makes no change in the general price level of manufacturers of book paper. The prevailing prices have been taken for the dollars-and-cents ceilings on the 14 standard grades while the differentials established maintain the same relationship between grade prices as existed in the base period. One important exception, however, is made in the case of differentials for lightweight book papers. Manufacturers of book paper as well as consumers are cooperating with the War Production Board in a general program of fibre conservation, has resulted in a more extensive use of lightweight papers. To compensate for extra costs involved in the production of these lightweight book papers, today's regulation establishes a slightly higher differential on sales of the lightweight papers.

To assist manufacturers in identifying their products with the papers for which maximum prices are spelled out in dollars-and-cents, the regulation lists the brand names of individual manufacturers, grouping them with the applicable dollars-and-cents ceiling.

Ceilings on book papers at the wholesale or merchant level, except for sales in the states of California, Oregon, Washington, Nevada, Idaho, Arizona, and Utah, are already provided by Maximum Price Regulation No. 400 (Merchants' Prices for Fine Papers and Certain Paperboards) which became effective July 5, 1943.

These book papers are not generally sold at retail. In the case of any sale occurring at retail, the General Maximum Price Regulation governs.

Glassine Committee Named

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., August 25, 1943—Seven business men who are representative of the glassine and greaseproof paper industry were appointed by the Office of Price Administration last week as a Glassine and Greaseproof Paper Industry Advisory Committee.

Purpose of the committee is to establish a working relationship between OPA and the industry that will facilitate the stabilization of prices on these papers, which at present are under the General Maximum Price Regulation but shortly will be put under a specific regulation.

Both large and small companies are represented on the committe, and the different geographical areas of the country where the industry operates are likewise represented.

Initial meeting of the committee will be held August 26 in Washington, D. C., when officers will be elected and other organizational matters dealt with.

The committee follows: John J. Riegel, president, Riegel Paper Corporation, New York,; Marvin Preston, vice-president, Thilmany Pulp and Paper Company, Kaukauna, Wis.; Robert F. Nelson, vice-president, the Glassine Paper Company, West Conshohocken, Pa.; Folke Becker, president, Rhinelander Paper Company, Rhinelander, Wis.; Paul Moore, president Westfield River Paper Company, Westfield, Mass.; N. G. Teren, vice-president, Oregon Pulp and Paper Company, Salem, Ore., and Paul Hodgdon, president, Deerfield Glassine Company, Monroe Bridge, Mass.

Ground Wood Paper Prices

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., August 25, 1943—Dollar-and-cent maximum prices for manufacturers on 33 grades of groundwood specialty papers, representing over 90 per cent of total production of these papers, were announced by the Office of Price Administration today.

On other grades of these papers, manufacturers will compute their ceilings by the application of price differentials between the listed and unlisted grades which prevailed during the base period, October 1, 1941 to March 31, 1942, or if unlisted grades were not sold during that period, by cost differentials.

These spelled out ceiling prices and methods for determining other ceilings are embodied in a new regulation, Maximum Price Regulation No. 449 (Ground Wood Specialty Papers) effective August 25, 1943.

Previously these papers at the manufacturing level were under the General Maximum Price Regulation, with manufacturers taking their highest March 1942 prices as ceilings.

The level of maximum prices continues now essentially the same as it was under the General Maximum Price Regulation except for three grades on which increases in ceilings are permitted. These three grades account for 21.6 per cent of the tonnage of all ground wood specialty papers. They are supercalendered rotogravure, novel paper and white pencil tablet. The average increase in ceilings for the three grades is 6.57 per cent. These grades are being currently produced at a loss or under profit margins too low to assure continued production. Increases in ceilings have been limited to amounts considered necessary to maintain continued production.

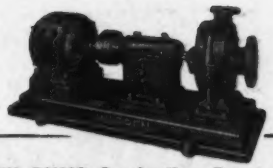
Ground wood specialty papers are types of papers, excluding newsprint and other specific exceptions, which contain 26 per cent or more of groundwood pulp and which are prepared for one or more of a large variety of end uses, the majority of which fall within the field of printing and publishing.

Ceilings at the wholesale or merchant level are under Maximum Price Regulation No. 400 (Merchants' Prices for Fine Papers and Certain Paperboards) except for sales by merchants in seven western states which are covered at present by the General Maximum Price Regulation.

Retail sales, which are negligible in quantity, remain controlled by the General Maximum Price Regulation.

The 33 grades, for which the new regulation establishes dollar-and-cent maximum prices, are divided into six groups: groundwood book papers, lightweight groundwood printing papers, general use papers, special end use converting papers, groundwood hanging papers, and general converting papers.

The listed maximum prices are base prices per hundred weight. Specifications are in accordance with industry practices. Minimum standard basis weights are specified, together with lightweight differentials which follow those currently prevailing in the trade. Dollar-and-cent differentials are established for quantities of sale, sheeting and packing, trimming, watermarking, supercalendering, colors, sizing and trim loss. Other differentials are provided by a general clause in the regulation. Manufacturers allow the carload rate of freight to destination, except as modified by the provisions of a special clause on freight allowance and a Pacific zone upcharge.



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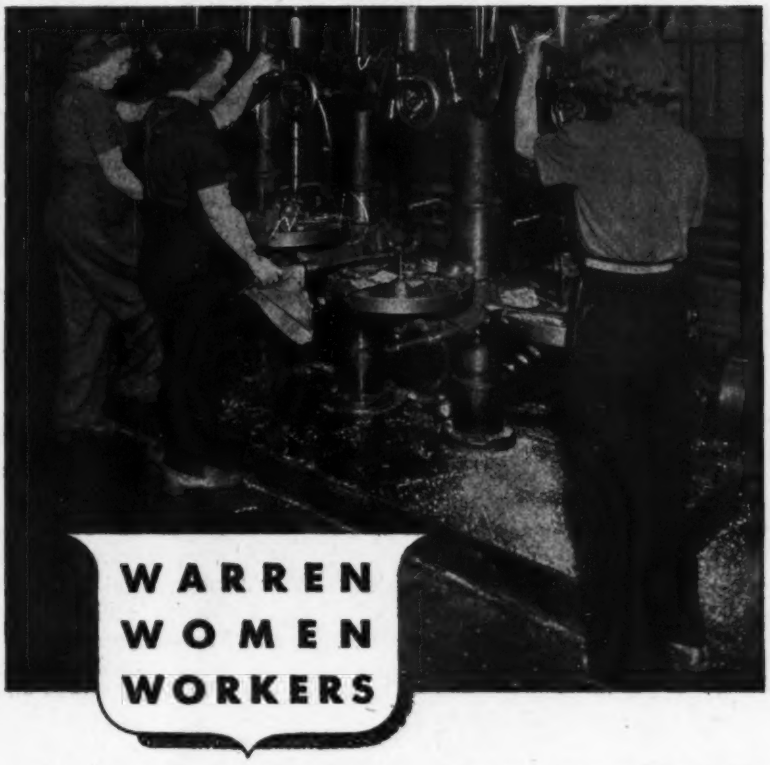

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No glamor . . . no fanfare to the job of machining small pump parts . . . or to many other types of work now being successfully performed by women in the plant of the Warren Steam Pump Company. Carefully trained and supervised by veteran Warren workmen, these women apply themselves diligently to the tasks at hand . . . not unmindful of the reputation that Warren Pumps have always enjoyed for efficiency, reliability and economy. Their contribution to our all-out war effort is real . . . substantial . . . patriotic.

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PAPER
TRADE JOURNAL
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Henry J. Berger
EDITOR

Vol. 117 August 26, 1943 No. 9

COMING EVENTS IN PAPER INDUSTRY

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, Fall Meeting, Palmer House, Chicago, September 21-24, 1943.

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

SHARING WEALTH

Politics in business assumes larger proportions as government and many business leaders discuss preliminary plans for trade pacts and international cooperation after the war. Interpretations of the Atlantic Charter, which the President proclaimed would eliminate want and establish security in every part of the world, have taken various forms. To some analysts, this is a political panacea which promises more than the American nation can be reasonably expected to meet or can afford to provide. On the other hand, New Deal supporters indicate that the Roosevelt Administration is entirely sincere in its promise to guarantee freedom from want to everyone, everywhere. Just how this global distribution of so large a proportion of the resources of the United States is to be accomplished has, however, not been disclosed. A critic has pointed out that a grave weakness in some modern political thinking is the making of extravagant and glowing promises which are likely to be vigorously opposed later on. What the United States will actually do after the war is not entirely assured. The reaction of the citizens after the first World War was not expected by the Wilson Administration. A nationalistic policy may not again be created to effectively eliminate the position of the United States as a member in a world league or other international cooperative body of nations, but it does appear somewhat presumptuous now to assume that it will be so.

Peace plans based on trying to make it possible for more people to enjoy more blessings does not mean that we shall play Santa Claus to the world, states Henry H. Heimann, executive manager-on-leave, of the National Association of Credit Men, in his monthly review of business issued on August 16. He points out that sharing our wealth with the rest of the world would merely make everyone poorer. "We must seek an after-the-war program which will eliminate Fascism, Nazism and dictators and at the same time teach the people of the oppressed countries how to acquire more necessities and luxuries. We may be called upon for some financial help but such assistance should be only secondary to the general program for rehabilitating the oppressed countries. We cannot be blind to the situations that gave rise to the collapse of some of the conquered countries or that permitted the rise of Fascist dictators within their borders," the credit chief said. "Unless these causes are studied and sensibly cured, there can be no assurance that a quarter of a century from now we may not be right back in this same situation. When I say the situation should be cured, I don't mean a perfect state is to be insured. No one can insure a happy and comfortable way of life. The history of the world shows that the only way to build that state of life in an enduring fashion is to earn it, not fall heir to it. If these ideal conditions were not the rewards of industry, decent living, decent thinking, then there would be no solid basis upon which civilization might rest."

In discussing post-war plans, Mr. Heimann pointed to important problems which must be solved within our own nation, He mentions two of these points especially—the great increase in our plant capacity and the importance of working out a procedure for settling war contracts which will give American industry an opportunity to start shortly after Victory Day on reconversion to civil production which in turn will continue a high percentage of our present employment ratio. "Plant capacity in our country has been tremendously increased, Mr. Heimann said. "The problem in this country at the close of the war will be one of distribution since a production that might be called a pre-war average will be effected in the post-war period with much less labor. These delicate problems of adjustment must be met in a realistic fashion. If we attempt to meet them by artificial means such as limitation of production per hour or limitation of the utilization of machinery, then we shall defeat the purpose of our victory as we will deny to many families the result of our productive capacity, and we will be handicapped in our highly competitive international trade."

Pointing out that there will be a critical time between the cessation of hostilities and the resumption of normal business unless we have agreed on the proper procedure for handling terminated war contracts, M. Heimann said: "Expeditious adjudication or at least large immediate tentative settlements will be necessary in order that business may be able to speed the transition period from war production to the job of supplying civil needs. When Victory Day comes, a solution of the short range problem rests largely in the hands of government. Every organization in the nation that has the country's welfare at heart should give thought and study now to working out a fair and

equitable termination procedure and the government of the United States should recognize that this item of providing for prompt settlement with war contractors will play a major part in what our domestic conditions may be when the war has finally ended."

In conclusion, Mr. Heimann said in part that, "All in all it can be said that the earlier alarmist point of view with respect to small business has not been borne out by the facts and it is questionable whether it will be. Much credit is due to the resourcefulness of many enterprising small business executives who despite the war conditions have found a way to survive."

Clarifies Print Paper Ruling

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., Aug. 25, 1943—To clarify paragraph (d) (1) of General Limitation Order L-240, which restricts the tonnage of print paper a newspaper publisher may accept any month, the WPB Printing and Publishing Division has issued Interpretation No. 2 of this order.

Referring to that part of the order which permits deliveries of a fraction of a carload to be inceased to one full carload in any month, it is explained that if deliveries aggregate a number of carloads plus a fraction of another carload, a publisher may carry the fraction of the carload over into his deliveries for the following next month.

"Thus," the interpretation reads, "if a publisher's quarterly quota of print paper would fill 25½ freight cars, he would be permitted to accept 8½ carloads per month. However, if he accepts only 8 carloads in the first month, he may accept 9 carloads in the next month." General Limitation Order L-240, as amended, issued August 17.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1943		Corresponding Weeks—1942	
July 10 (Holiday July 4)	66.3	July 11	69.7
July 17	87.6	July 18	81.5
July 24	90.5	July 25	79.2
July 31	91.5	August 1	81.0
August 7	90.0	August 8	81.4
August 14	91.6	August 15	77.5

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1942	104.5	103.9	102.9	100.4	95.3	87.4	75.8
1943	87.2	88.9	89.5	88.7	91.5	86.5	*84.4*

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1942	80.8	82.8	90.6	86.9	80.1	90.4
1943	....	....	....	....	....	....

COMPARATIVE YEARLY SUMMARIES

	1936	1937	1938	1939	1940	1941	1942	1943
Year to Date..	77.9	87.4	68.2	78.7	87.0	94.0	94.2	88.4
Year Average..	80.4	79.8	71.5	83.4	85.6	97.4	90.4	....

*Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS†

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1937	83	89	89	91	88	80	69	77	72	70	57	47	75
1938	56	63	63	60	60	59	59	60	70	73	67	61	64
1939	65	73	76	74	69	73	68	77	82	91	88	77	77
1940	78	75	74	76	82	85	77	79	78	85	82	77	78
1941	81	88	89	89	91	94	92	98	95	99	98	90	92
1942	102	101	101	95	82	72	68	75	76	81	82	77	84
1943	86	88	94	94	96	94	*89*	..	..	..	..	..	..

Week ending July 10, 1943—69
Week ending July 17, 1943—91
Week ending July 24, 1943—97
Week ending July 31, 1943—97
Week ending Aug. 7, 1943—94
Week ending Aug. 14, 1943—98

†Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.

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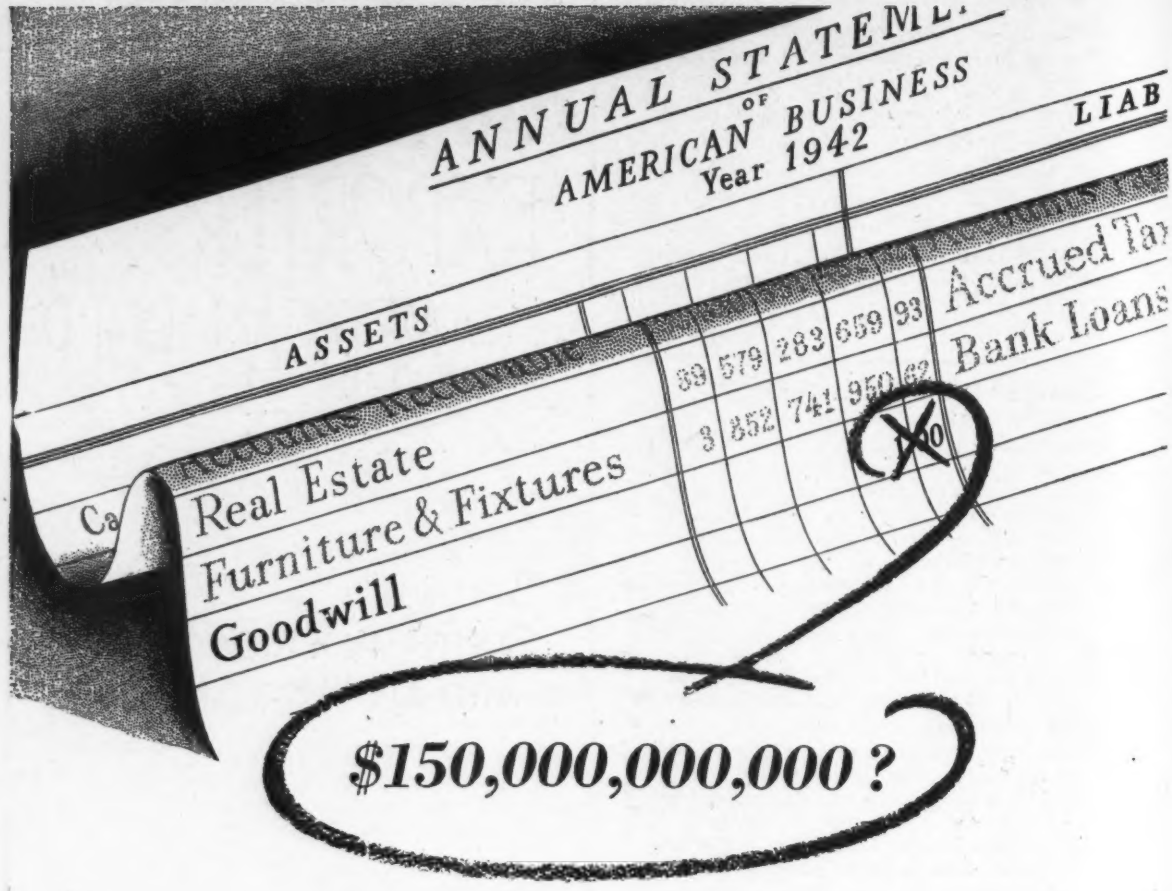

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Edited by R. G. Macdonald, Secretary

A New Method of Wood Evaluation*

By C. H. Keepers[1]

The industry expends large sums of money in the evaluation of most of the raw materials used in the production of pulp and paper; yet it has largely neglected the material that represents the greatest single item of cost in most pulp mills, the pulpwood supply. This is not an oversight but is due largely to a lack of practical methods of evaluation that can be applied at a cost in keeping with the value of the information obtained.

Owing to trade customs, pulpwood is usually purchased by the cord, a unit of volume consisting of a pile 4 by 4 by 8 feet, or 128 cubic feet of stacked wood, including the air space between the bolts. Obviously, wood piled in this manner may stack up to the specified dimensions, yet contain greatly variable amounts of actual wood. Thus, a precise knowledge of the amount of sound, solid wood in each purchased cord is of utmost importance to the pulp manufacturer, as it greatly influences the yield of pulp to be obtained.

While it is recognized that the chemical composition of wood varies to a certain extent in different species, the greatest variation is likely to exist in the physical properties of the trees themselves. In this respect, there are two major factors to be considered: the density or weight per cubic foot and the volume of the actual wood in a cord.

The density of the wood is an inherent characteristic. It varies to a marked degree within all species and in single trees of the same species, depending on the age, geographical location, and growing conditions of the stand.

Because density is an inherent characteristic, the selection of a desirable species from certain geographical locations is about the only practical means of exercising any control over this important factor.

On the other hand, the solid-wood content of the cord is greatly influenced by wood's preparation in respect to trimming, selection of diameter sizes, and the length of the bolts into which the trees are cut.

TABLE I.—EFFECT OF BOLT LENGTH ON SOLID-WOOD CONTENT

	8 ft.	4 ft.	2 ft.
Average Length, Inches	96.00	48.00	24.00
Number of Sticks per Cord	58.00	122.00	262.00
Volume Solid Wood per Cord, cu. ft.	94.77	98.00	103.40

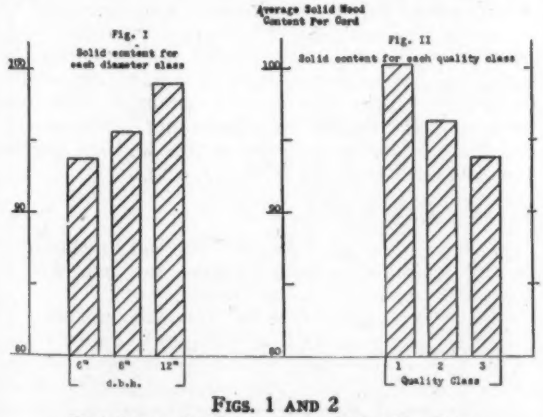
Table I shows the effect the length of the bolts has on the solid-wood content of the cord. These data were compiled from the results of a series of tests conducted by the Woods Department of the Nekoosa-Edwards Paper Company. Several cords of 8-foot, peeled spruce bolts were selected and stacked, one at a time, in a standard cord rack. Each pile was carefully leveled off by using a string attached to the uprights of the rack and stretched across the face of the pile at an estimated point where the volume of wood protruding above was equal to the volume of the voids immediately below the line. Each bolt was measured for length, and for diameter, midway between the ends. The actual volume of wood was then computed from these dimensions. The bolts were then reduced to 4-foot lengths, repiled to the cord rack and the shrinkage in occupied volume recorded. The procedure was repeated, reducing the wood to 2-foot lengths. As the same bolts were used in each test, factors other than length (excepting perhaps size distribution) were more or less constant in each case. Note particularily the rise in solid-wood content as the length of the bolts was reduced. Apparently a more pronounced degree of crook in the longer bolts accounts for these differences.

Figures 1 and 2 show the apparent relation between diameter size and solid-wood content. This information resulted from a study of a black spruce stand on Nekoosa-Edwards lands in Keweenaw County, Michigan.

The columns at the left show the average solid-wood content of a number of cords of wood cut from these trees in 100-inch lengths. It should be stated in particular that the diameter size designated by the numerals in the brackets below each column specify

* Presented at the meeting of the Lakes States Section of the Technical Association of the Pulp and Paper Industry at Appleton, Wis., March 9, 1943.

[1] Wood Technologist, Nekoosa-Edwards Paper Co., Port Edwards, Wis.



FIGS. 1 AND 2

Black Spruce—Keweenaw Partial Cutting Experiment
Description of Quality Classes; Pertaining to Stem Characteristics only: 1. Cylindrical, Straight and Smooth. No Physical or Pathological Injuries. 2. Lower Part of Commercial Bole May Be Somewhat Irregular and Rough but in Most Cases Is Cylindrical. Slight Lean or Crook May Be Present. 3. Bole Frequently Lopsided or Fluted. Churn Butt and Large Forks Present. Tree May Be and Generally Is Leaning, Crooked or Containing Heavy Sweep.

the diameter of the trees at breast height, and as such, contained bolts down to a minimum top diameter of 4 inches. It is readily observed that as the diameter increases the solid-wood content also increases.

In addition, the columns at the right show the relation of solid wood in respect to quality classes of trees. The trees in each class were carefully selected from all diameter classes with a view towards sorting for quality only.

Determination of Actual Wood Content

From this study it is readily seen that the factors affecting solid-wood content are numerous, and the value of each purchased unit can be accurately determined only through a knowledge of the amount of actual wood contained therein.

In the past there have been several widely used methods for determining this.

The first, and perhaps the most accurate, is the water-displacement method. This method is not extensively used for handling large quantities, as the equipment necessary and the need to transfer the material to some central location for measuring make this method costly.

The second method is to measure the dimensions of the individual bolts and calculate the volume. Usually, where large quantities are involved, it is necessary to resort to some means of selecting samples to represent the whole. This sampling, together with the subsequent measuring of the bolts, is time-consuming, costly, and subject to errors.

The third method is weighing the wood and determining the moisture content. This, as in the second method, usually requires careful selection of representative samples and requires time.

Photograph of Wood

A new method has been developed whereby the additional handling and interference with the regular movement of the wood in the yards would be entirely eliminated. This is accomplished photographically.[2]

The object of this method is directed to an accurate determination of the volume of wood in a stack of bolts or logs. A view of a stack showing the cut ends of logs indicates generally the proportion of the logs to voids in the stack. However, mere inspection gives only an approximation of the volume of actual wood contained in the stack.

The present method consists simply of measuring the proportion of wood-area to air-space on a number of equispaced parallel lines across the face of a pile of wood. In order to avoid any delays in wood movement, a photograph showing a side elevation of a carload or similar lot is obtained. For this purpose we use a Kodak 620, although any suitable camera would do. The photograph is enlarged to 5 by 7 inches and placed in the frame of a specially constructed instrument designed to obtain the necessary measurements.

[2] Patent application covering the method and apparatus has been applied for.

Fig. 3

Air-Space to Wood-Area Measurement

Briefly the instrument, as shown in Fig. 3, consists of an objective *O* for scanning the photograph, attached to two operating screws *A* and *B*. By manipulating screw *A*, the objective is moved progressively over areas of the photograph which disclose *air space*, and by movement of the other, screw *B*, over areas which disclose *wood area*. When the objective is being moved across wood area by operating screw *B*, the movement is registered on Scale I, and when the objective is being moved across air space, by the other operating member, this latter movement is registered on both scales I and II. Scale I thus gives a cumulative reading, while Scale II indicates only the reading over air space. The ratio of the air space reading on this scale to the cumulative reading from Scale I is the ratio of actual air space to wood area in the total linear distance traversed. A simple check of the reading may be obtained by reversing the procedure and measuring the wood; the sum of this reading and the air-space reading should be equal to the total linear distance.

When this operation is completed, the process is repeated on a number of other parallel lines. From the readings obtained a mean ratio of wood may be determined.

The instrument is provided with a third screw *C* operated to traverse the frame at right angles to the scanning path. Scale III is provided to indicate the distance of this movement and is desirable in that it allows for readings on equispaced lines and thus eliminates a choice of lines by the operator. This scale also allows rechecking or relocation of previously measured lines.

In comparing one stack of wood with another, no additional measurements are necessary. The readings are translated by simple arithmetic into percentage of wood area and air space, and from these the solid-wood content per cord is readily calculated. If the actual solid content in a stack is desired, the overall dimensions of the pile must be obtained. This may be done in the regular scaling manner, or measuring rods may be included in the picture and the dimensions obtained from the photograph itself.

Total Volume Determination

We have often used the latter method to determine the total stacked volume of piles too irregular to accurately measure by other means.

This is accomplished in the following manner: A measuring rod is held at right angles to the base line of the pile and is included in the photograph. By using a planimeter, an instrument designed to determine the area of any plane figure by passing a tracer around its outer boundary, the area of the side elevation of the wood depicted by the photograph is obtained. A ruler is used to measure the length of the base line and this divided by the total area gives the average height of the figure. By the use of dividers

this height is laid off on the pictured measuring rod, showing the average height of the actual pile. Thus with the known length of the pile and of the bolts, the total volume is readily computed.

With the known stack dimensions the actual amount of solid wood can be determined by multiplying the total area of the face of the pile by the percentage of actual wood area.

In order to check the precision of the method and device, the following tests were conducted.

Ten cords of balsam pulpwood were cut to exactly 48-inch lengths.
Each of the ten cords was piled separately in a standard cord rack and leveled off to the proper height.
Each pile was photographed.
Each bolt was measured midway from the ends with a diameter tape and the dimensions recorded.
Each bolt was immersed in a tank of water and the displacement volume recorded.

From these data the following information was compiled:

A. The water displacement volume of each cord.
B. The volume of each cord calculated from the individual bolt dimensions.
D. The volume of each cord obtained by the present photographic method using horizontal, parallel lines spaced at ⅛, ¼, and ½ inch intervals.

TABLE II.—DETERMINATION OF SOLID-WOOD CONTENT BY THREE DIFFERENT METHODS

			D, inch		
Cord No.	A	B	⅛	¼	½
1	94.81	98.87	94.7	100.0	101.0
2	96.98	99.45	97.0	95.5	97.5
3	98.22	100.57	97.5	95.8	90.0
4	98.64	99.52	98.5	96.1	96.7
5	97.10	99.43	97.0	94.5	92.0
6	100.04	100.54	97.0	95.0	94.5
7	96.26	98.63	97.5	98.3	95.5
8	95.90	98.16	98.0	94.5	96.2
9	98.32	100.22	99.4	99.5	97.6
10	93.05	95.20	96.1	96.8	93.2
Average	96.94	99.06	97.26	96.60	95.42

The results are given in Table II. For practical purposes we assumed that the water displacement method gave us the true or actual volume of each cord, although a slight error was known to exist because of water absorption by the seasoned bolts. However, by immersing the bolts one at a time and using a calibrated tank, the whole process was quickly executed and we felt that the error was negligible.

The values obtained by the photographic method in all three intervals more nearly approached the values obtained by water displacement than did the other method involving bolt dimensions. This is rational when we consider the fact that calculations using bolt dimensions assume that the volume is that of a regular geometric solid. This is rarely, if ever, exactly true in the case of trees or pulpwood. It is at times considered sufficiently exact to permit the use of this method.

Measurement of Carload Lots

The results of this experiment strongly indicated the possibility of photographing and measuring larger piles, carload lots in particular.

Accordingly a pile of wood 40 feet long was stacked 5 feet high with 4-foot bolts, alternating the large and small ends, to represent a pile similar to that on a carload. By alternating the bolts in the pile the diameter of each bolt was measured on one end only, and the volume was calculated from these dimensions. In order to reduce distortion in the picture by parallax, the pile was photographed from a distance of 35 feet, thus dividing the pile in half and treating it as two separate units. The values for the two pictures were averaged to represent the entire pile. The bolts were finally immersed to obtain the water displacement volume.

The results are shown in Table III.

TABLE III.—DETERMINATION OF THE SOLID WOOD CONTENT PER CORD OF A PILE 40 FEET LONG BY 5 FEET HIGH

Water Displacement	Bolt Measurement	Photographic Method at ¼ in. Intervals
97.00	96.02	96.42

A. Represents the water displacement volume.
B. Shows the volume by measuring bolt dimensions.
D. Shows the results from the photographic method using readings at ¼ inch intervals.

In this trial it was again evident that the photographic method was sufficiently accurate for all practical purposes.

Since early this spring we have used this method. We have evaluated over 20,000 cords of wood at a cost of a few cents per cord. As this represents approximately 10% of our total wood receipts, we feel that we have obtained a fairly accurate cross section of the entire supply.

Use of Evaluation Data

Perhaps at this time the question uppermost in most minds is "To what practical use can this evaluation data be applied?"

There are two practical means of applying the information thus obtained. The first and most desirable would be an agreement between producer and consumer, whereby a premium would be paid for wood of outstanding quality and a proper deduction would be made for wood of inferior quality, based not on the judgment or estimate of a scaler but on a more scientific basis of volume determination. In other words, experience shows that the average value of a cord of balsam pulpwood, for example, is approximately 75% wood volume. If this was an accepted standard and a price of $14.00 per cord was agreed upon, then a cord of balsam containing 70% wood volume would be purchased at a cost of $13.06. On the other hand a cord containing 80% would be purchased at $14.93. This would have a tendency to

TABLE IV.—EFFECT OF O.P.A. CEILING ON WOOD COSTS OF PULP MANUFACTURED FROM PINE

		EVALUATION DATA					WOOD COSTS			
Producer	Amount of Pulpwood Produced of Total Supply	Wood Area %	Solid Wood Per Cord %	Density	Weight/ Cord Moisture-free	Cords/ Tons Air-Dry Pulp	Ceiling Price	Freight	Delivered Cost	Cost/ Ton Air-Dry Pulp
A	4.13	66.28	88.15	24.87	2192.00	1.7109	$12.00	$. . .	$12.00	$20.53
B	0.02	68.19	90.69	24.69	2239.00	1.6751	12.00	1.59	13.59	22.76
C	0.03	66.28	88.15	24.43	2153.00	1.7422	12.00	1.38	13.38	23.31
D	35.18	70.81	94.18	24.40	2298.00	1.6326	12.00	2.32	14.32	23.38
E	5.82	67.86	90.25	24.12	2177.00	1.7226	12.00	1.59	13.59	23.41
F	4.34	63.52	84.48	24.87	2101.00	1.7857	12.00	2.00	14.00	25.00
G	0.37	71.60	95.23	24.50	2333.00	1.6077	12.00	4.52	16.52	26.56
H	5.19	73.73	98.06	24.06	2359.00	1.5898	12.00	4.90	16.90	26.87
I	1.67	72.79	96.81	21.52	2083.00	1.8002	12.00	2.94	14.94	26.89
J	39.07	72.29	96.15	24.42	2348.00	1.5974	12.00	4.89	16.89	26.98
K	2.46	68.10	90.57	24.85	2251.00	1.6666	12.00	4.37	16.37	27.28
L	0.22	73.36	97.57	20.81	2030.00	1.8484	12.00	2.99	14.99	27.71
M	0.17	70.72	94.06	21.05	1980.00	1.8957	12.00	3.76	15.76	29.88

encourage the producer to make every effort to obtain a premium price.

With the present OPA ruling on pulpwood prices, it is doubtful that such a system could be used. Instead the second method may be applied.

In Table IV information obtained on the average values of pine pulpwood from several producers shipping to the sulphate mill is given. In this we have anticipated the wood costs per ton of air-dry pulp based on the new ceiling price. The producers are listed according to increased wood costs per ton of pulp. Producer "A", for example, shipped 4.13% of our total pine supply at a lower cost than any other producer. Note that this was not due to a high-solid-wood content or to density but rather to a low delivered cost per cord.

Thus, with information such as this it is simply a case of placing contracts with the producer that supplies the material at lowest cost.

The theory behind this method is as follows:[3] Take any rectangular area such as ABCD (Fig. 4). Let this area be composed of two parts, namely, the (I) area ABPTE which is occupied by wood, and (II) the area BCDE which is the area represented by void space.

1. Divide the total area into infinitely large number of n strips (to make illustration possible only 18 strips are shown in Fig. 4). For convenience, the strip interval may be designated as k. The interval is $AB/18$.
2. Divide the area ABPTE into three parts, AFTE, FGPT, and GBP. The area of each part can be represented by the sum of infinitely narrow strips. The area AFTE = Sum of l K, where m is from 1 to 6, and l_m is a symbol denoting the length of strips. The area FGPT = Sum of l_{mk}, where m is 6 to 12 and l_m is the same as above. The area GBP = Sum of l_{mk} where m is from 12 to 18.
3. If the average length of all l

for portion AFTE = l_1
for portion FGPT = l_2
for portion GBP = l_3

then:

Area AFTE = l_1pk
area FGPT = l_2rk
area GBP = l_3sk

where p, r and s represent number of strips in each respective area. In the figure above $p = r = s = 6$. However, if AF, FG and GB are not equal, there will be a different number of strips in each part of ABPTE.

4. Total area ABPTE is, therefore, equal to

$$l_1pk + l_2rk + l_3sk = k(l_1p + l_2r + l_3s) = kn\,\frac{l_1p + l_2r + l_3s}{n} =$$

$$knL$$

where L = average length for the entire wood area ABPTE or average of l_1, l_2, and l_3, weighted by p, r, and s. If $p = r = s$, $L = \frac{l_1 + l_2 + l_3}{3}$

5. Similarly, the total area ABCD may be represented by $K\,n\,Lo$ where Lo is the average length of the quadrangle. In the example above it is obviously equal to either AD or BC.
6. Consequently, the ratio of the wood area to the total area is

$$\frac{K\,n\,L}{K\,n\,Lo} = \frac{L}{Lo} = \frac{n\,L}{n\,Lo}$$

where L = average length and nL = total length.

The ratio of the two areas — i.e., wood area *vs.* total area — is equal to the total length occupied by wood (nL) to the total length occupied by wood and void space, nLo.

[3] By Suren R. Gevorkiantz, Silviculturist, Lake States Forest Experimental Station, St. Paul, Minn.

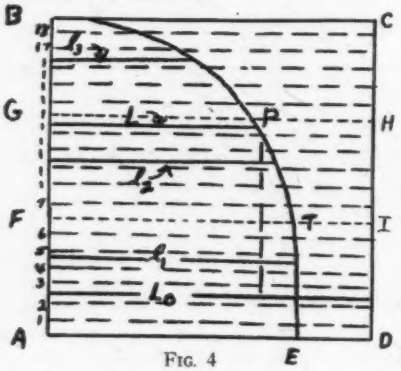


FIG. 4

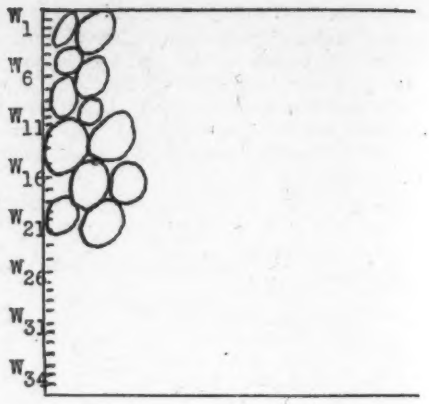


FIG. 5

Using this method in actual practice, the error to be expected when averages of 6 regularly spaced wood-content measurements are employed can be illustrated with an actual case. Thirty-four wood content measurements *(W)* were made at small, regular intervals down a pictured pile, the consecutive order being indicated by a subscript. Thus, as shown in Fig. 5, the measurements were W_1, W_2, W_3, etc. to W_{36}.

Average wood contents *(A)* were calculated for 25 different combinations of 6 regularly spaced measurements. Thus:

$$A_1 = 1/6\,(W_1 + W_7 + W_{13} + W_{19} + W_{25} + W_{31})$$
$$A_2 = 1/6\,(W_2 + W_8 + W_{14} + W_{20} + W_{26} + W_{32})$$
$$A_{25} = 1/6\,(W_{25} + W_{31} + W_3 + W_9 + W_{15} + W_{21})$$

The mean and standard deviation of the A values are calculated because it is desired to know how closely values of A, taken at random, approximate the best mean obtained with all groups.

The formula[4] for the sum of squares of deviations from the mean A is:

$$\Sigma(A - \bar{A})^2 = \Sigma A^2 - \frac{(\Sigma A)^2}{N} \qquad (1)$$

in which $\bar{A}$ is the mean value of A.

The best estimate of standard deviation is

$$\delta = \sqrt{\frac{\Sigma(A - \bar{A})^2}{N - 1}} \qquad (2)$$

[4] Goulden, C. H., "Methods of Statistical Analysis." New York, John Wiley & Sons, p. 11 (1939).

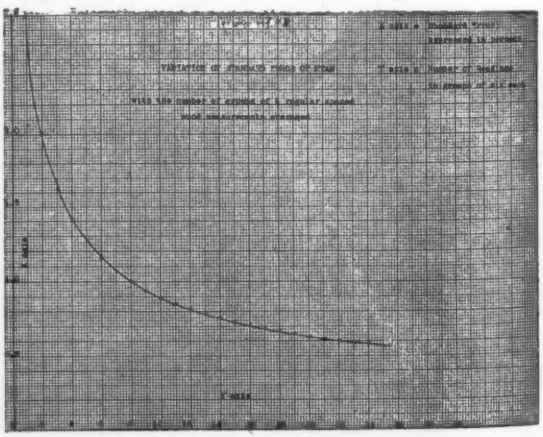


FIG. 6

An actual example will illustrate

N	A
1	77.04
2	80.43
3	79.11
4	79.15
5	78.21
6	81.26
7	80.90
8	77.44
9	76.26
10	80.57
11	83.37
12	79.92
13	75.24
14	81.18
15	79.11
16	79.15
17	78.21
18	81.26
19	80.90
20	77.44
21	76.26
22	80.57
23	83.37
24	79.92
25	75.24
25	ΣA = 1981.51

Thus we find for Equation 1:

$$\Sigma A^2 = 157{,}175.95$$

$$\frac{(\Sigma A)^2}{25} = 157{,}055.27 \qquad (3)$$

$$\Sigma(A - \bar{A})^2 = 120.68$$

and employing Equation 2:

$$\delta = \sqrt{\frac{120.68}{25-1}} = 2.243 \qquad (4)$$

The standard error of estimate is given by the formula

$$SE = \frac{\delta}{\sqrt{N}} = \frac{2.243}{\sqrt{N}} \qquad (5)$$

It is possible, therefore, to calculate standard errors to be expected for different N values where N represents the number of A values employed. SE values versus N values are shown in Fig. 6.

Conclusion

1. The procedure is fast, inexpensive and reasonably accurate.
2. All or as many shipments as desired can be evaluated.
3. Operation of the measuring device requires but little experience.
4. Calculations are reduced to simple arithmetic.
5. All individual measurements of piles or bolts and possible resulting errors are eliminated.
6. A photographic record of the subject is available for future reference.
7. The procedure offers excellent opportunities for purchasing wood on a sound, scientific basis.

Acknowledgment

The author is indebted to the management of Nekoosa-Edwards Paper Company for permission to publish the information contained in this paper.

Bristol Co. Gets Army-Navy E

The Bristol Company, manufacturer of recording and controlling instruments, was presented the Army-Navy "E" at a colorful ceremony at Waterbury, Conn., July 29, 1943. The master of ceremonies was the Honorable Joseph E. Talbot, Congressman, 5th District of Connecticut. The invocation was delivered by the Rev. John C. Walker, D. D., pastor of the 2nd Congregational Church of Waterbury, Conn. His Excellency, Raymond E. Baldwin, Governor of Connecticut, made the address. Commander Edward N. Parker, U.S.N., made the presentation of the Army-Navy "E" Flag and Howard H. Bristol, president of The Bristol Company, accepted.

TAPPI Notes

Rear Admiral W. B. Young, Chief of the Bureau of Supplies and Accounts of the United States Navy, will be the keynote speaker at the TAPPI Army and Navy Requirements Conference to be held at the Palmer House, Chicago, Ill., September 21-24, 1943. Eight officers of the Army and five officers of the Navy representing each branch of these services will present their paper and packaging problems at this meeting. Several hundred packaging contractors of the Services have been invited by the Army and Navy to attend. Organized visits to the printing plants of R. R. Donnelly, W. F. Hall Printing Company, and the Chicago Tribune are being arranged.

Merrill E. Norwood, formerly superintendent of the Columbia River Paper Mills is now night superintendent of the St. Helens Pulp and Paper Company, St. Helens, Ore.

Paul Torre is now in the Chemical Branch of the Signal Corps at Fort Monmouth, N. J.

Arthur G. Ready, formerly manager of the St. Marys Kraft Corporation is now engineer for Rayonier, Inc., Shelton, Wash.

Rex Brandt, formerly with the Michigan Carton Company is now director of Applied Research for the Corn Products Refining Company, Argo, Ill.

John B. Chandler, formerly with the Southern Waxed Paper Company is now maintenance foreman and chemist for the Bell Aircraft Corporation, Marietta, Ga.

Philip S. Bolton, formerly with the Clinton Company is now director of research for the Robert Gair Company, New London, Conn.

E. B. Beede, formerly of the Foxboro Company is now engineer for the Watertown Arsenal, Watertown, Mass.

Allan G. Strang, formerly with the Soundview Pulp Company is now in the Sulphite Division, Bowaters-Newfoundland Pulp and Paper Mills, Corner Brook, Newfoundland.

Charles B. Kirchen, formerly with the International Business Machines Corporation is now with the American Cyanamid and Chemical Company, Kalamazoo, Mich.

Thage Dahlgren, formerly with the Gardner-Richardson Company is now assistant manager for Peter J. Schweitzer, Inc., Elizabeth, N. J.

Members of TAPPI who change their address should notify the Technical Association of the Pulp and Paper Industry, 122 East 42nd street, New York 17, N. Y. Many notify the PAPER TRADE JOURNAL only and thereby fail to receive some of their publications until the change is made known sometimes a few weeks later.

The 1943 Technical Association Papers is now in the bindery and will be mailed soon. It will contain an author index covering volumes 1 to 25 inclusive. The author index can be reprinted separately and sold at $2.50 per copy if fifty or more members wish to have copies. Those interested should notify R. G. Macdonald, secretary of TAPPI, as soon as possible.

The TAPPI Maine-New Hampshire group will meet jointly with the Northeastern Division of the Superintendents Association at the Poland Spring Home, Poland Spring, Maine, on September 17 and 18, 1943. Aside from the sports and social program there will be techincal discussion of starch substitutes and plastics. T. M. Barry of Fraser Paper Ltd, is Chairman of the TAPPI Maine-New Hampshire group.

Flow Properties of Coating Clays at High Rates of Shear*

By Kenneth A. Arnold[1]

Abstract

A procedure has been developed for measuring the flow properties of coating clay slips at rates of shear in the range of 8.0×10^4 reciprocal seconds, which is in the range of shear produced in high-speed coating machines. During the measurement, the slip is also subjected to pressures comparable to those in the actual coating nip. The procedure distinguishes between the Newtonian, dilatant, and thixotropic types of fluid flow, and indicates the behavior of slips possessing these types of flow in a roll nip. A method is presented for the quantitative determination of the degree of dilatancy and thixotropy of clay slips. This method does not destroy the structure of the clay system previous to the actual measurement of its flow properties.

A technique has been developed to insure reproducibility of the measurements of flow properties. The variables involved have also been investigated.

At high rates of shear, the nip viscosities of clay slips were found to be critically dependent upon clay concentration, especially at very high solids contents. The concentrations of three commercial paper coating clays required to produce slips of equal nip viscosity were found to differ widely. It was possible to prepare a fluid slip with a higher concentration of the clay possessing the smallest particle size and least hydration capacity. A much lower concentration was attainable with the clay of the highest particle size and highest hydration capacity. The third clay, which showed the largest particle size but the lowest degree of hydration, was found to be intermediate as to maximum possible concentration in a fluid slip.

Extremely dilatant slips were produced from the two clays of lower hydration capacity, although one of these showed a small particle size. No degree of dilatancy could be attained in slips of the more highly hydrated clay, although it possessed the larger particle size.

With these clays, the range of dispersing agent required to give minimum viscosity to the slips was found to increase as the concentration of clay was increased. This was true with either dispersing agent—sodium pyrophosphate or sodium silicate. However, the amount of sodium silicate used as the dispersing agent is much more critical than that of sodium pyrophosphate.

In general, the flow properties of clay slips were found to change considerably with the amount of mechanical work to which they were subjected. On ball milling, the slips showed an initial decrease in viscosity to a minimum point, then a gradual increase in viscosity over several hours of milling. The test for hydration of the clay particles indicated a gradual increase in this property during milling. Greater changes took place during milling in slips containing comparatively low percentages of the dispersing agent. In the preparation and application of coating clay colors, the mechanical work applied to the color should be carefully controlled in order to produce uniform coating.

The results of nip viscosity measurements showed very little correlation with low-shear viscosity measurements in the MacMichael viscometer. Furthermore, certain slips which showed weakly dilatant behavior at low rates of shear, according to Sheets, were actually thixotropic under high shear. Thus, it follows that viscosity measurements made at one rate of shear, or at relatively low rates of shear, have little significance as an index of the flow behavior at high rates of shear.

By a careful selection of the amount of work applied, the amount of dispersing agent used, and the concentration of the clay, it was possible to prepare slips from different clays which showed very similar flow properties.

No work has been published concerning the viscosity of clay slips at high rates of shear. Sheets *(1)* has made a study of clay systems at low rates of shear and presented a survey of the literature covering previous studies on clay viscosity.

A satisfactory measurement of the flow properties of coating colors cannot be made with the usual type of viscometer or plastometer. Such instruments break down the structure of the system during the measurement and are incapable of producing conditions which obtain at a high rate of shear. The first objective of this investigation was the development of an instrument to measure flow properties, which would fulfill these requirements and which would distinguish between thixotropic and dilatant types of flow. If possible, such an instrument should simulate mechanical conditions for the high-speed coating operation.

Previous work has indicated that the flow properties of commercial coating clays will depend rather critically on the clay concentration in the slip and on the type and amount of dispersing agent used. In preparing colors for roll coating, it is desirable to maintain high solids content, as well as a relatively low viscosity. To accomplish this, sufficient dispersing agent is added to give the minimum viscosity to the clay slip. In this investigation, an attempt was made to evaluate the flow characteristics of certain clays under high solids content and with percentages of dispersing agent comparable to those used commercially and to determine the importance of these factors at relatively high rates of shear.

Apparatus

The testing device consists of an inclined glass plate, down which a smooth steel cylinder is allowed

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A portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wis., 1942. This work was carried out under the direction of B. W. Rowland.

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to roll. The essential parts of the instrument are show in Fig. 1. A piece of ¼-inch plate glass, 6 by 1 foot, is placed on a planed 2-inch plank which, in turn, is supported by a table. One end of the table is adjustable so that it may be raised or lowered to produce any desired angle of inclination of the glass plate. The roll is shown at the right of the picture, after having passed over the clay sample. This is a 16-pound solid steel roll, with a ground and polished surface. The roll is 10 cm. long and 11.1 cm. in diameter, and is dynamically balanced to insure uniform acceleration down the inclined plane. A sliding wooden stop, which is used in conjunction with the centimeter scale to define the speed of the roll, also sets the course of the roll. The speed of the roll can be varied over a wide range by changing the inclination of the plate; small variations are made by starting at different positions up the incline.

Operation

In measuring the flow properties of clay slips or other fluids of high viscosity, a complete line of contact must be maintained between the roll and glass plate. To observe the flow of a liquid, a measured volume is placed on the glass plate over a chosen point, and the roll is released from its starting position at a given distance up the incline. As the roll passes over the droplet of fluid, the latter is rolled out into a symmetrical pattern, as shown by the pattern of clay on the plate in Fig. 1.

The volume of fluid applied was measured accurately with a 1.5-cc. hypodermic syringe, graduated both in cc. and in minims. A convenient volume for application was found to be 2 minims (0.1232 cc.) and this amount was used for the tests in this investigation.

If a fixed volume of fluid is applied, the area of the pattern for most fluids decreases as the speed of the roll increases. However, the change in area with speed varied considerably for different clay slips. The speed of the roll at the point of impact with the clay was calculated from the angle of inclination, the distance of travel along the plane, and the moment of inertia of the roll. The rolling friction was found to be negligible. The range of roll speed used in this work was from 40 to 140 cm. per sec. The maximum rate of shear produced by the instrument may be approximated by dividing the velocity of the roll by the thickness of the clay film. Actually, the plane of greatest shear in the clay droplet will occur immediately ahead of the actual nip, so that the distance over which the velocity gradient extends in this plane is slightly greater than the average film thickness. However, it is the range of rate of shear which is of interest rather than the exact values.

The area of the fluid pattern is measured by tracing the outline on glassine paper and following the tracing with a planimeter. It was decided to use the

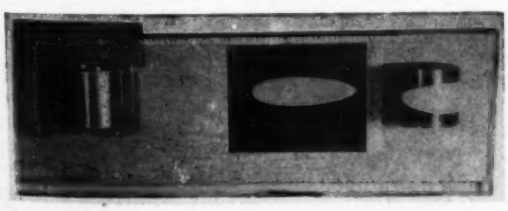

Fig. 1
Testing Device

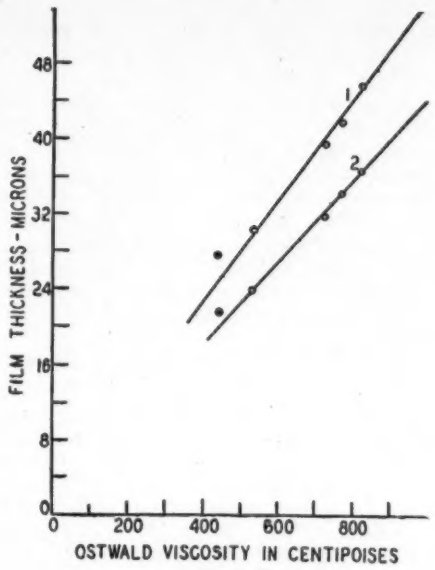

Fig. 2
Relation of Film Thickness to Ostwald Viscosity
O Castor oils. ● 95% Glycerol.
Roll Speed: 1, 80 cm./sec.; 2, 60 cm./sec.

curves of film thickness vs. roll speed to indicate the flow properies of the slips as compared with the flow of Newtonian liquids in the given range of shear. This thickness is calculated by dividing the volume of the fluid (0.1232 cc. in all cases) by the area of the pattern obtained. If the quotient is multiplied by 10^4, the film thickness is expressed in microns.

It should be emphasized that the fluid under test is subjected to a high pressure during the measurement, because of the small area of contact in the nip. Therefore, the term "nip viscosity" will be used in referring to the resistance of a liquid to flow under the high pressure and high rate of shear produced in the instrument during the measurement, and will be expressed as the thickness of the film in microns. Thus the advantages of this instrument for the measurement of the flow properties of clay slips are that it simulates the actual coating nip, produces a high rate of shear, and does not disturb the fluid prior to the measurement. It was found to be extremely sensitive in revealing small differences in the composition and previous mechanical treatment of the clay slips.

Measurement of Newtonian Liquids

Because no measurements of fluid viscosities at comparable rates of shear are available, an exact calibration of this instrument is impossible. Therefore, the most logical approach seems to be a comparison of the flow behavior of clay suspensions as measured by the instrument with that of Newtonian fluids of similar viscosity. A series of castor oils and a 95% glycerol solution were measured for various speeds of the roll. The viscosity of each oil was measured in an Ostwald viscometer at 23 deg. C. Figure 2 shows the relation between the nip viscosity and the Ostwald viscosity at this temperature. Assuming that the viscosity of these Newtonian fluids is independent of the rate of shear up to that produced in the nip, these lines indicate that the film thickness as measured by this technique is directly dependent upon the viscosity of the fluid.

The more complete film thickness-speed curves for two of these oils and for the glycerol solution are given in Fig. 3. The lines for these three fluids are very nearly parallel.

The application of the technique of dimensional analysis is valuable in estimating the relation between the variables which determine the thickness of the fluid film. The main factors which determine the film thickness *(w)* are: the weight per unit length *(F)* of the metal cylinder, the velocity of the cylinder *(v)*, the viscosity *(n)* of the liquid being tested, and the radius of the cylinder *(R)*. The film thickness is some function of these variables, or

$$W = f(F, v, n, R).$$

by means of dimensional analysis, it can be shown that

$$w = k(F/nv)^a R.$$

To evaluate the exponent, the data for the castor oils (as expressed in Figs. 2 and 3) were substituted in the above equation, and the values of the film thickness *(w)* were plotted against the quantity *(nv/F)* on log-log coordinate paper (Fig. 4). The points for 95% glycerol are also included on the plot. In Fig. 4, *w* is expressed in microns, *n* in centipoises, *v* in cm. per sec., and *F* in grams. The weight of the roll used is 7260 grams.

By means of this plot, it is possible to construct the line of constant viscosity through any desired point on the film thickness-roll speed charts given later for the various clay slips. The line so constructed corresponds to the flow behavior of a Newtonian fluid of the viscosity chosen. In Fig. 3, the lines *a* and *b* drawn through the curves for 74% B clay and for 10% bentonite at the roll speed of 40 cm. per sec. were calculated from Fig. 4. The differences between the curves for the slips and the calculated curves indicate the degree of dilatancy and thixotropy, respectively.

Another advantage of the curve in Fig. 4 is that

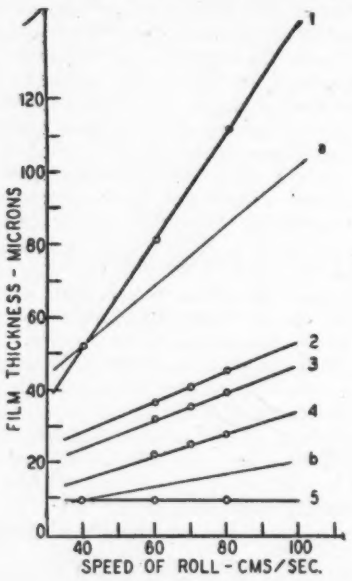

FIG. 3

Comparison of Anomalous and Newtonian Types of Flow
1. 74% B clay; 2 and 3. Castor oils; 4. Glycerol; 5. 10% Bentonite clay
A and B. Calculated curve for 74% B clay and 10% bentonite clay, respectively, at roll speed of 40 cm./sec.

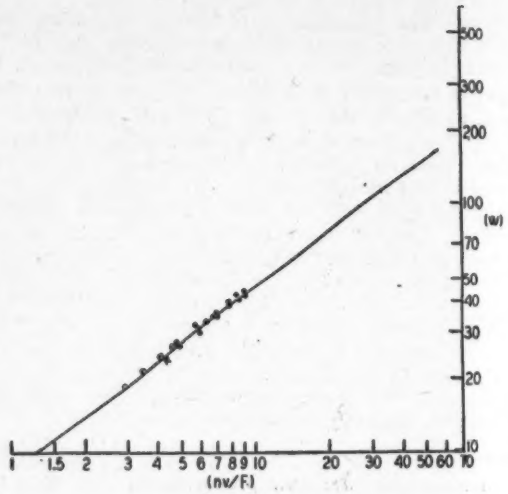

FIG. 4

Calibration Curve
● Castor oils. ○ Glycerol.

it enables one to calculate the absolute viscosity (in centipoises) of any clay slip at any one rate of shear within the range in which the slip has been tested. As an example, we may calculate the viscosity of the 74% B clay slip shown in Fig. 3 at two different rates of shear.

At 40 cm. per sec., $w = 50\mu$. From Fig. 4 the value of *(nv/F)* corresponding to $w = 52$ is 10.5; $n = (F/v) \times 10.5$, or $n = 1900$ centipoises.

At 80 cm. per sec., $w = 112\mu$; therefore, $(nv/F) = 28.5$ and $n = 7260/80 \times 28.5 = 2600$ centipoises. As the roll speed increases from 40 to 80 cm. per sec., the viscosity of the 74% B clay slip increases from 1900 to 2600 centipoises. This increase in viscosity of the dilatant slip with increase in rate of shear affords a quantitative measurement of the degree of dilatancy.

To construct the Newtonian line through the point $w = 52$, one takes the viscosity calculated above at 40 cm. per sec., or $n = 1900$. Then, at 80 cm. per sec., $(nv/F) = (1900 \times 80)/7260 = 20.8$. From Fig. 4, $w = 86\mu$. Thus, the Newtonian line is drawn through 52μ at 40 cm. per sec., and 86μ at 80 cm. per sec.

This procedure was repeated for the slip of 10% bentonite clay shown in Fig. 3. The viscosity of the bentonite slip was found to decrease from 236 centipoises at 40 cm. per sec. to 118 centipoises at 80 cm. per sec. This decrease in viscosity with increasing rate of shear affords a quantitative measurement of the degree of thixotropy of the slip.

To indicate the degree of dilatancy or thixotropy of the clay slips tested, curves for Newtonian liquids were calculated from Fig. 4 which were in the same range of viscosity; these are shown as the finer lines on the subsequent charts for the clay slips.

Measurement of Dilatancy

The next problem was to determine the behavior of a dilatant fluid when subjected to a high shear. A 74% slip of commercial coating clay B was found to be very dilatant, as indicated by its strong resistance to flow when stirred rapidly and its extreme fluidity when stirred slowly. Figure 3 shows that the slope of the film thickness-speed curve for this dilatant slip is much greater than that for the Newtonian

liquids. The reason for this greater slope is evident; the greater the impact of the roll on the clay droplet, the greater is the flow resistance of the clay. This stiffening is reflected in an abnormal increase in film thickness with increasing shear.

Measurement of Thixotropy

Thixotropy might be considered the opposite of dilatancy, if it were not for the time factor involved in the former. There is a gradual build-up of structure with time in thixotropic systems, whereas the transformation is instantaneous for dilatant systems. In this work, it was found that thixotropic structure was destroyed in extruding the volume from the hypodermic syringe onto the plate. After extrusion, the structure begins to build up again. Therefore, for all measurements, the interval of time between dropping the clay on the plate and starting the roll was standardized at 15 seconds.

The film thickness-speed curve for a strongly thixotropic system—a 10% suspension of bentonite clay—is shown in Fig. 3. The slope of this curve is very much lower than that for a Newtonian fluid. Apparently, the structure of thixotropic systems is destroyed to some extent by the action of the roll. The greater the impact of the roll, the more extensive is the destruction of the system. Thus, the effective viscosity of the system becomes lower with increasing shear; the slope values of curves for thixotropic suspensions will lie between the value for this extreme case and that for the Newtonian fluids.

Effect of Temperature

In this work, the temperature was maintained within one degree of 23°C. Clay slips are not nearly as sensitive to temperature variation as are the Newtonian fluids.

Uniformity of Film Thickness

To determine the uniformity of the films for Newtonian fluids, blue dye was dissolved in glycerol and patterns were formed on glassine paper. From reflectance measurements on the General Electric recording spectrophotometer, it was indicated that the deviation in thickness of the films did not exceed 5%.

The uniformity of the clay patterns was tested by allowing the patterns on the roll and glass to dry, removing the film material, and weighing on a microbalance the amount of clay included by each of four fractions of the total areas. The maximum deviation in thickness from one section to another was 4.0%—that is, the clay films were sufficiently uniform so that the thickness might be used as a direct indication of the viscosity of the clay at high rates of shear.

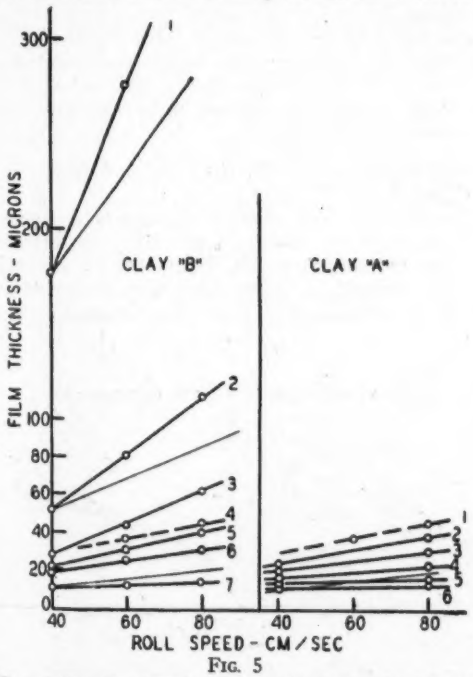

Fig. 5

Effect of Clay Concentration Using 0.5% Sodium Pyrophosphate

Clay B: 1-3, 5-7. 75, 74, 73, 70, and 65% clay, respectively; 4. Castor oil

Clay A: 1. Castor oil; 2-6. 64, 62, 60, 58, and 55% clay, respectively

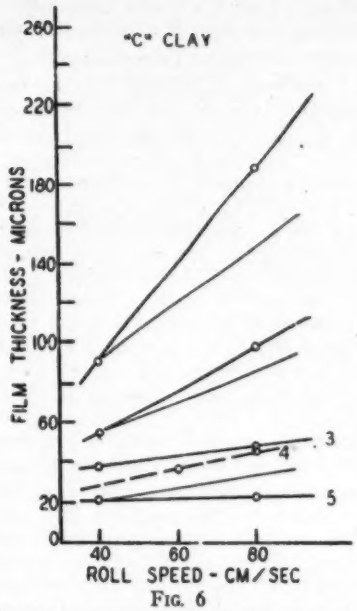

Fig. 6

Effect of Clay Concentration Using 0.5% Sodium Pyrophosphate

Clay C: 1-3, 5. 68, 67, 66, and 62% clay, respectively; 4. Castor oil

Materials Used

The three clays studied in this work are designated as "A", "B", and "C". X-ray studies indicated that the diffraction pattern from clay B corresponds exactly with that for kaolin. In clay A, illite was found in addition to kaolin. Clay C was also mostly kaolin, with some crystobalite. The data indicate essentially the same size for primary particles. Sheets *(1)* found that the particle-size distributions for clays A and C were essentially the same, whereas clay B showed considerably smaller particle size. Thus, the differences in particle size as measured have been due to aggregates.

Preparation of Clay Slips

To insure reproducibility of clay slips, it was found necessary to control the amount of mechanical work done on the slips during their preparation. It was found that slips could be duplicated by mixing the suspensions in a ball mill, using steel ball bearings instead of pebbles, for a period of at least 1 hour. A 1-liter Abbé porcelain ball mill jar was used with sixty ¾-inch diameter steel ball bearings.

The proper amounts of water and dispersing agents were added to the jar, and 200 grams of dry clay were mixed in with a spatula. The steel balls were then added, and the jar was rotated at 62 r.p.m. The

dispersing agents used in this work were tetrasodium pyrophosphate and sodium silicate.

Measurement of Flow Properties

At each interval of milling the jar was opened, the hypodermic syringe was filled with clay, and 2 minims of the slip were pressed onto the plate at the correct spot. The steel roll was released from the distance required for the desired speed, and the pattern thus formed was allowed to dry. The pattern was traced on glassine and removed, and the procedure then repeated for the next speed position. When the nip viscosity was measured at intervals of 10 cm. per sec. through a range of roll speeds from 20 to 140 cm. per sec., the curve of film thickness vs. speed was found to approach a straight line. To reduce the testing time, points were taken at speeds of 40, 60, and 80 cm. per sec. to establish these lines for the clay slips.

The change in viscosity measured at low rates of shear during milling was followed with a MacMichael viscometer, with the cup speed set at 28 r.p.m.

The hydration of the particles was estimated at each milling interval by the method of Comber *(2)*. The volume of clay settled out in following this method was taken as an indication of the relative degree of hydration of the particles where the suspensions compared contained equal amounts of electrolytes; for this reason, the method was not used for comparing different clays.

Results and Discussion

Effect of Clay Concentration

The three commercial paper clays were made into slips of varying concentration, each with 0.5% of tetrasodium pyrophosphate decahydrate on the dry weight of clay. The results of measurements of nip viscosity after a period of 1 hour of milling are shown in Figs. 5 and 6.

The systems made from clay A gave various degrees of thixotropic tendency at these rates of shear. Fluid slips could not be prepared with concentrations of this clay higher than 65%. It was not possible to prepare slips of this clay which were dilatant at these rates of shear, whereas at low rates of shear Sheets *(1)* observed a weak dilatancy over this range of clay concentration. In comparison, slips of clay B and C possessed a high degree of dilatancy over a narrow range of solids content. For all three clays, it was observed that small changes in concentration caused a great change in nip viscosity.

It is important commercially that a clay exhibiting low viscosity at high solids content afford the possibility of attaining a heavy coating. In the present cases, the concentrations of clay given are higher than those used in coating colors although, actually, the effective concentration of clay in the coating operation may increase to these values through the loss of water to the raw stock.

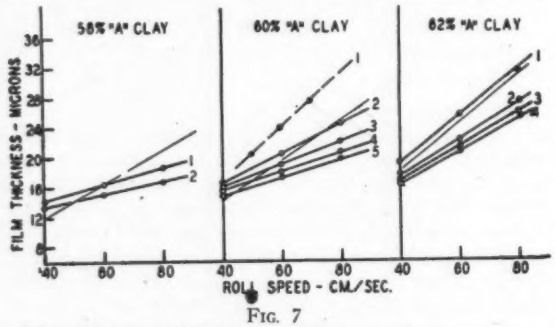

Fig. 7

Effect of Amount of Sodium Pyrophosphate as Dispersing Agent
58% A clay: 1. 0.5%; 2. 0.3%
60% A clay: 1. Castor oil; 2. 0.3%; 3. 0.5%; 4. 2.5%; 5. 1.0%
62% A clay: 1. 0.5%; 2. 0.6%; 3. 1.0%; 4. 2.0%

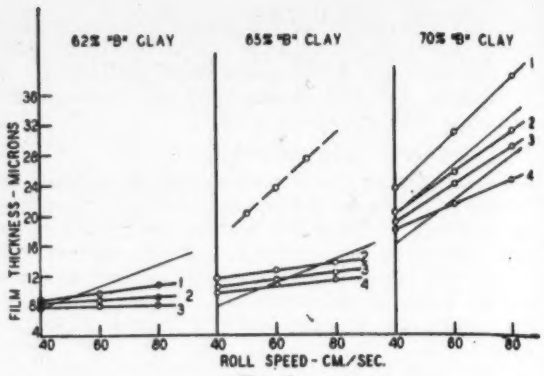

Fig. 8

Effect of Amount of Sodium Pyrophosphate as Dispersing Agent
62% B clay: 1. 0.2%; 2. 2.0%; 3. 0.6%
65% B clay: 1. Castor oil; 2. 0.5%; 3. 2.0%; 4. 1.0%
70% B clay: 1. 0.3%; 2. 0.5%; 3. 2.0%; 4. 1.0%

Because of the change of slope with the change in solids content, a single viscosity measurement does not give sufficient indication of the flow behavior of the slip. It also is evident that the flow properties may change considerably over the entire range of rate of shear involved in the coating processes.

The differences in the flow properties of the slips of these three clays apparently are largely due to differences in particle-size distribution and hydration characteristics. The particles of clay B are considerably smaller than those of the other two clays. Because of the illite in clay A, this clay possesses higher base-exchange and hydration capacities than the others *(3)*.

The less hydrous B and C clays form very dilatant slips, although they are of greatly different particle sizes. Thus, the possibility of producing dilatant slips appears to depend upon hydration more than upon particle size.

Effect of Sodium Pyrophosphate as the Dispersing Agent

The effect of the amount of dispersing agent on the flow properties of slips prepared from these clays is shown for clay A in Fig. 7 and for clay B in Fig. 8. The viscosity of these slips was measured after 1 hour of ball milling. The curve for castor oil and

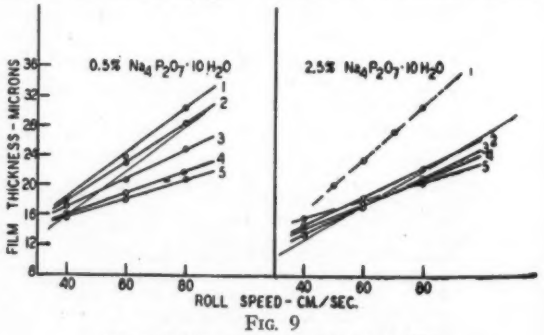

Fig. 9

Effect of Milling on Slips of 60% A Clay
0.5% Sodium Pyrophosphate 1-5. 4, 3, 2, 1, 0.5 hr., respectively
2.5% Sodium Pyrophoshate 1. Castor oil; 2-5. 5, 3.4, 2, (0.5 or 1) hr., respectively

the calculated curves are given to indicate the deviation of the flow of the clay slips from Newtonian flow. At a given percentage of pyrophosphate, the higher the clay concentration the higher is the nip viscosity, and the more nearly do the slips approach Newtonian flow.

The slips of both clays A and B show that there is a certain range of pyrophosphate required for minimum viscosity at each concentration of clay, and that this range increases with increasing clay concentration. The action of the dispersing agent is modified to some extent by the base-exchange reactions taking place in the slip.

Effect of Sodium Silicate as the Dispersing Agent

A series of slips were prepared as above, using sodium silicate as the dispersing agent. The silicate has the same effect as the pyrophosphate, except that a smaller percentage is required to produce a given viscosity.

Effect of Milling Time

The effect of milling on slips of clay A dispersed with pyrophosphate is shown in Figs. 9 and 10. Samples of clay slips were removed for measurement at intervals of 0.5, 1, 2, 3, 4, and 5 hours of milling. Figure 9 shows the effect of ball milling on two slips of 60% A clay, with 0.5 and 2.5% sodium pyrophosphate as the dispersing agent. The film thickness in microns is plotted against the speed of roll at each interval of milling. Figure 10 shows the change in nip viscosity at each roll speed, in MacMichael viscosity,

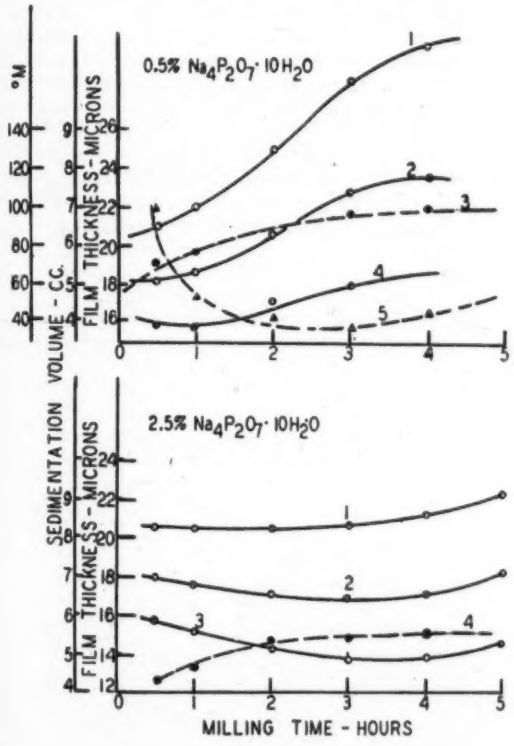

Fig. 10

Effect of Milling on Slips of 60% A Clay

0.5% Sodium Pyrophosphate 1, 2, 4. Film thickness of 80, 60, and 40 cm./sec., respectively; 3. Sedimentation volume; 5. MacMichael viscosity

2.5% Sodium Pyrophosphate 1, 2, 3. Film thickness of 80, 60, and 40 cm./sec., respectively; 4. Sedimentation volume

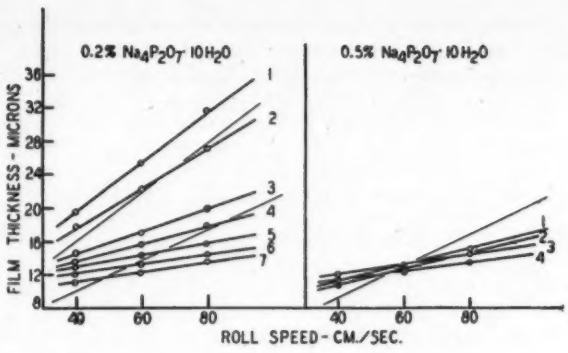

Fig. 11

Effect of Milling on Slips of 65% B Clay

0.2% Sodium Pyrophosphate 1-7. 16, 6, 5, 4, 3, 2, (0.5 or 1) hr., respectively

0.5% Sodium Pyrophosphate 1-4. 6, 5, 0.5, (1, 2, 3, or 4) hr., respectively

and in hydration of the slip during milling. The MacMichael viscosity was run at 28 r.p.m. with a number 30 wire for all tests.

The slip with the lower amount of dispersing agent shows a much greater change in nip viscosity during milling, and more nearly approaches Newtonian flow than the slip with the greater amount of pyrophosphate. At each roll speed, the nip viscosity of each slip decreases at first, then gradually increases as the milling proceeds. The hydration of the clay particles appears to increase gradually during milling; this increase is considerably greater for the slip with the lower percentage of dispersing agent. Figure 10 also shows the lack of correlation between the low-shear MacMichael viscosity readings and the nip viscosity readings at high rates of shear. MacMichael readings higher than 300 degrees were not recorded.

The effect of milling on slips of 62% A clay was found to be closely parallel to that on the slips of lower concentration shown above. Further milling tests on slips of 58 and 60% A clay, with sodium silicate as the dispersing agent, showed the same trends as those with pyrophosphate.

The effect of milling on slips of clay B is shown in Figs. 11 and 12. It is observed that, on milling, both the nip viscosity and the slope of the film thickness-speed curves increase considerably at the lower percentages of dispersing agent, but to a lesser degree as the dispersing agent is increased. To determine whether the trend continues over long periods of milling, the 65% B clay slip was milled for 16 hours. Apparently the trend does continue, but the rate of change decreases after 6 hours of milling.

Thus, the common effect of milling on both clays is that the nip viscosity of the slips increases noticeably, and the slope of the film thickness-speed curves increases to approach Newtonian flow. The change in hydration during milling is generally greater for slips of clay A than for those of clay B. Various other slips treated in the same manner confirmed the above results.

Apparently, the action of the steel balls during the milling period is much greater the higher the viscosity of the slip. Undoubtedly, as the balls fall through the slip, the shearing forces on the particles are much greater at the higher viscosities. The two apparent changes taking place during milling are a decrease in particle size and an increase in the hydration of the particles. The latter is probably the result of base exchange; the sodium of the dis-

persing agent replaces some of the calcium atoms in the clay lattice. Since sodium is more highly hydrated than calcium, the hydration of the clay is thus increased. This process actually removes water from the medium and increases the effective concentration of the clay, tending to increase the viscosity of the slip throughout the milling.

The shearing action of the balls tends to tear the particles apart, resulting in mechanical dispersion and increased efficiency of the dispersing agent. This process tends to decrease the viscosity of the slip. It is generally agreed that clay particles are built up of layers of alumina and silica. Transverse fractures break crystal valence bonds and lead to the development of active areas on the crystal surface. Thus, when pyrophosphate is present, such areas may adsorb the pyrophosphate ion preferentially and stabilize the dispersion of the particles. In the first stages of milling, the decrease in viscosity observed is probably due to mechanical dispersion and increased efficiency of the dispersing agent. Therefore, when excess pyrophosphate is used, the effects of hydration and dispersion counteract each other to some extent, and the change in viscosity on milling is not very great. However, if there is no excess pyrophosphate, the amount of pyrophosphate is not sufficient to satisfy all the newly freed valences, and a reagglomeration of particles occurs which tends to increase the viscosity of the slip. In the latter case, the effects of both hydration and fracture of the particles tend to cause an increase in viscosity on milling.

In order to test this hypothesis, three different procedures were carried out. First, particle-size measurements were made on a clay slip before milling and after milling for 6 hours, using an Odén sedimentation balance. A considerable decrease in particle size was found to occur during the milling.

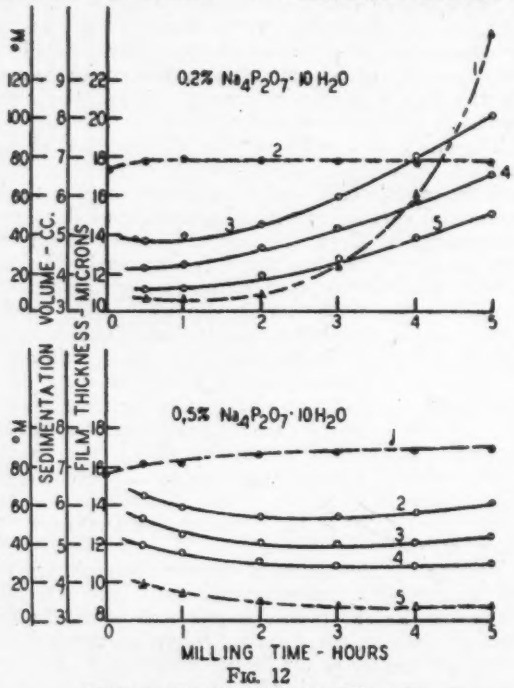

FIG. 12

Effect of Milling on Slips of 65% B Clay

0.2% Sodium Pyrophosphate
1. MacMichael viscosity; 2. Sedimentation volume; 3, 4, and 5. Film thickness of 80, 60, and 40 cm./sec., respectively

0.5% Sodium Pyrophosphate
1. Sedimentation volume; 2, 3, and 4. Film thickness of 80, 60, and 40 cm./sec., respectively; 5. MacMichael viscosity

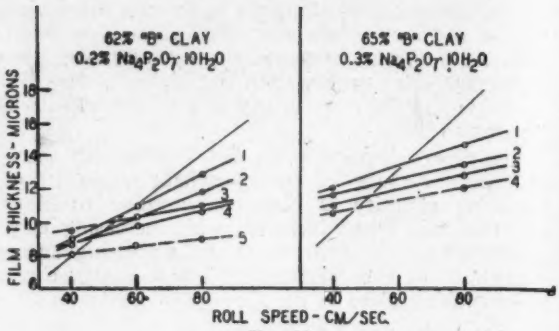

FIG. 13

Effect of Additional Pyrophosphate after Milling

62% B Clay
0.2% Sodium Pyrophosphate
1-4. 3, 2, 0.5, 1 hr., respectively; 5. 3 hr., 0.6%

62% B Clay
0.3% Sodium Pyrophosphate
1-3. 4, (2 or 3), (0.5 or 1) hr., respectively; 4. 4 hr., 0.5%

The second procedure was the ball milling of clay-water mixtures, without a dispersing agent. There should be relatively little change in hydration resulting from base exchange, and the effect of mechanical dispersion should predominate. These slips showed a continuous decrease in viscosity during 3 hours of milling.

The third procedure was to ball mill a slip with a low percentage of pyrophosphate for 3 or 4 hours to a high viscosity, then add some dry pyrophosphate, and continue the milling for 10 minutes to mix it thoroughly. Such an addition should redisperse the system and reduce the viscosity. The results for two slips of clay B are given in Fig. 13. After 3 and 4 hours of milling, as shown by the two sets of solid lines, the pyrophosphate was increased to 0.6 and 0.5%, respectively; the subsequent drop in viscosity is shown by the dotted lines. In both cases, the addition causes the nip viscosity to drop below the minimum value reached during normal milling. Thus, the increase in viscosity appears to be caused by a lack of sufficient dispersing agent to cover the newly formed active areas on the surface of the particles.

The previous work indicates that it is possible, by the combination of clay concentration, dispersing agent, and amount of milling to prepare clay slips from different clays which show similar flow properties.

It is obvious that the addition of starch or protein adhesive to clay slips will greatly change the flow properties in any given case, depending upon the redistribution of electrolyte and water between the clay and starch. The presence of raw stock in place of the glass plate would extend the similarity of the procedure to actual coating conditions. Such experiments are visualized as the logical steps to be taken next in this particular investigation.

Little reference has been made to the probable importance of clay particle shapes in the flow behavior of clays. Several electron micrographs prepared of the clays used in the present investigation revealed the fact that a satisfactory relationship between particle shapes and flow properties would necessitate a more comprehensive investigation than could be included in the present study.

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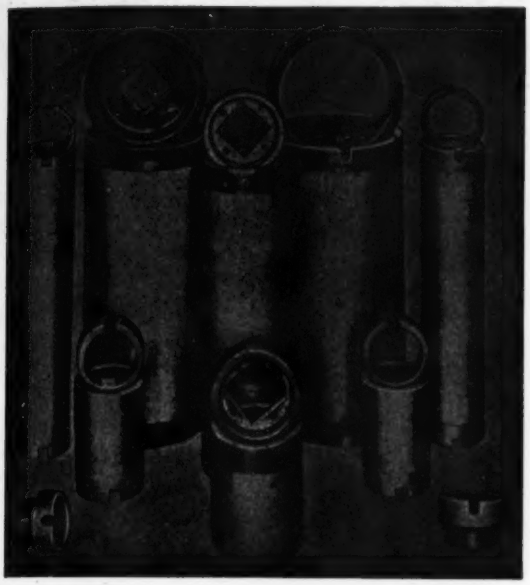
2. Comber, N. M., *J. Soc. Chem. Ind.* 41:77-80T(1922).
3. Grim, R. E., *J. Am. Ceram. Soc.* 22:141-151(1939).



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New York Paper and Pulp Market Review

OPA Establishes New Maximum Base Prices On Uncoated and Coated Book Papers—Mill Inventories of Wood Pulp At Record Low Level—Waste Paper Market Strong—Cotton Cuttings Active.

Office of the PAPER TRADE JOURNAL,
Wednesday, August 25, 1943.

Demand continues very active for all paper and paper products. Reports from many manufacturers' representatives, jobbers, and general paper merchants during the current week reflect growing concern at the prospect of an increasing tightness in the supply situation. Manpower is widely recognized as the basic cause and the critical pulpwood situation seems at this date to be likely to be only partially overcome. The general over-all supply situation is unfavorable for anything approaching satisfactory trade activity. Reports also indicate that unless a substantial increase in the supply of pulpwood can be assured within the next two months, a serious situation will follow in most grades of paper, with strict allocation necessary to distribute supplies as widely as practicable. Reports indicate that the present situation is most largely attributed to the failure of government agencies to adequately estimate the country's actual needs for paper and paper products, and the consequent failure of these agencies to recognize paper as an essential industry.

Paper production for the week ended August 14 was estimated at 91.6%, compared with 77.5% for 1942, with 99.0% for 1941, with 84.6% for 1940, and with 82.9% for the corresponding week for 1939.

Paper board production for the week ended August 14 was 98.0%, compared with 73.0% for 1942, with 92.0% for 1941, with 73.0% for 1940, and with 72.0% for the corresponding week for 1939.

OPA release, T-1121, dated August 19, establishes specific ceiling prices and pricing methods on book papers, not generally sold at retail, in which sales the General Maximum Price Regulation governs.

The order on Book Paper, Maximum Price Regulation 451, effective on August 25, 1943, provides maximum prices for listed grades, naming manufacturers and their brand names.

Uncoated Book Papers, base price, per cwt., 4 cases or equivalent, are as follows: A Grade, E&F. (M.F.), untrimmed, $8; B Grade, $7.80; C Grade, $7.55; D Grade, $7.30; E Grade, $7.05. No. 2 Offset, $8.45, trimmed 4 sides.

Coated Book Papers, No. 1 Glossy Coated, trimmed 4 sides, $11.90; No. 2, $10.85; No. 3, $10.15; No. 4, $9.80; No. 5, $9.30.

C2S Offset, $10.40; C1S Litho, varnish, $10.50; C1S Litho, non-varnish, $9.80.

Manufacturing differentials for supercalendering, finish, sizing, and watermarking are stated.

Wood Pulp

So serious has the pulpwood supply situation become that unless cutting in the Northeast and Lake States is not in full progress within two months, pulp production from these areas will likely not rise above 60% of normal in 1944.

Wood pulp inventories are currently reported at the lowest point on record.

Rags

Mill buying of new cotton cuttings is steady in good volume. The colored grades are in heavy demand at ceiling prices. The current price on No. 1 white shirt cuttings are averaging 25 cents under the ceiling price.

Old Rope and Bagging

Mill buying of old No. 1 Manila rope is steady and absorbing all available supplies at the ceiling price.

Trading in scrap bagging is reported on a limited scale at this date. Prices are soft and continue nominal.

Old Waste Paper

Mill buying of all grades of waste paper is very active at ceiling prices.

The OPA has started injunctions against nine dealers and two mills, seeking to restrain them from violating price regulations. Action was filed against the Robert Gair Co. and the San-Nap-Pak Manufacturing Company.

Twine

Demand for all grades of twine is heavy. No important change in the market situation has been reported during the current week. Military requirements continue to take almost all imported fibers.

ARMY AND NAVY REQUIREMENTS CONFERENCE AT CHICAGO

(Continued from page 15)

1. The Practical Aspects of Water Vapor Permeability Testing by C. A. Southwick, Shellmar Products Company, Mt. Vernon, Ohio.
2. Application of a Thermal Conductivity Method to the Determination of Water Vapor Permeability of Packaging Materials by L. Boor and J. K. Dixon, American Cyanamid Company, Stamford, Conn.
3. Report of Special WVP Testing Projects by George R. Sears, Institute of Paper Chemistry, Appleton, Wis. and C. G. Weber, National Bureau of Standards, Washington, D. C.
4. The I. P. C. Creasing Method of Preparing Samples for WVP Tests by George R. Sears.
5. Committee Recommendations for Tentative Emergency Standard for Water Vapor Permeability Measurement by Major James d'A. Clark, Chicago Quartermaster Depot.

Army and Navy Exhibit

From September 21 to 24 inclusive, the Palmer House Exhibition Hall will house one of the most interesting and important exhibitions of paper products used for War purposes by the Army and the Navy. Included in the 10,000 square feet devoted to the Armed Forces will be a specially constructed theater, seating 150, in which will be shown significant motion pictures to illustrate various phases of the war and the part being played by paper and package. Army and Navy officers representing all branches will be present to discuss the details regarding the materials on display. The exhibit will run one day beyond those devoted to technical sessions to permit careful consideration of all displays.

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Paper products designed for war emergencies will undoubtedly be generally adopted for post-war use.

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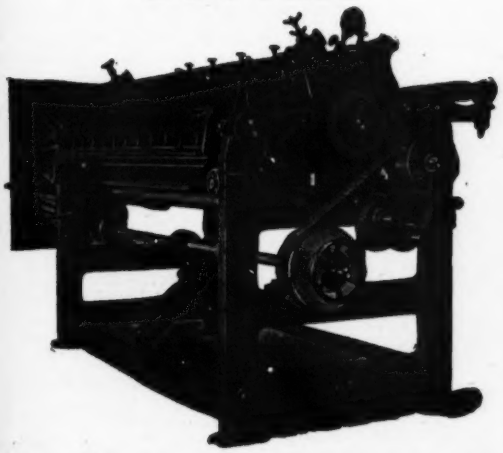

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CHICAGO CHARLOTTE NEW ORLEANS TORONTO

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL.
Wednesday, August 25, 1943.

BLANC FIXE—Prices on blanc fixe are firm and continue unchanged at prevailing market levels. The pulp is currently quoted at $40 per ton in barrels, at works; the powder is offered at $60 per ton, f.o.b., works. Demand reported fair for week.

BLEACHING POWDER—Prices on bleaching powder are firm. Current demand reported active. Bleaching powder is currently quoted at $2.50 per 100 pounds, in drums, at works.

CASEIN—OPA maximum prices on processed acid-precipitated casein are as follows; 10,000 pounds or more, 24 cents per pound; 2,000 pounds, 24¼ cents per pound; less than 2,000 pounds, 24¾ cents per pound, f.o.b., shipping point.

CAUSTIC SODA—Prices on caustic soda are reported unchanged. Market for the current week is reported tight. Solid caustic soda is currently quoted at $2.30 per 100 pounds; flake and ground at $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—Quotations on china clay are firm and continue unchanged. Demand reported fair for the current week. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay is quoted at from $12 to $22 per ton at mine. Imported clay is quoted at from $13 to $25 per long ton, ship side.

CHLORINE—Quotations on chlorine unchanged. Government demand for war use continues heavy. Supplies larger. Prices firm. Chlorine is currently quoted at from $1.75 per 100 pounds, in single unit tank cars, f.o.b., works.

ROSIN—Quotations on some grades of rosin are lower for the current week. "G" gum rosin is currently quoted at $4.01 per 100 pounds in barrels, Savannah. "FF" wood rosin is currently quoted at $3.86 per 100 pounds in barrels, New York. Seventy per cent gum rosin is currently quoted at $4.20 per 100 pounds, f.o.b., works.

SALT CAKE—Prices on salt cake are firm. Demand reported moderate for the current week. Domestic salt cake is currently quoted at $15 per ton in bulk; chrome salt cake at $16 per ton. All prices in car lots, f.o.b., shipping point.

SODA ASH—Quotations on soda ash are firm and continue to conform to prevailing market quotations. Demand heavy. Quotations on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Prices on corn starch are unchanged for the current week. Supply situation tight. Pearl is currently quoted at $3.10 per 100 pounds; powdered starch at $3.20 per 100 pounds. All prices in bags, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm. Supply is adequate for the current week. The commercial grades are currently quoted at $1.15 to $1.25 per 100 pounds; iron free at from $1.75 to $1.85 per 100 pounds, in bags, car lots, f.o.b., works.

SULPHUR—Prices of sulphur are firm and continue to conform to prevailing market quotations. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are quoted at $18 per ton.

TALC—Quotations on talc are firm and continue unchanged at prevailing market prices. Domestic talc is currently quoted at from $16 to $21 per ton, at mills. No quotations on imported talc.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

News, per ton—

Roll, contract	*$54.00	@	—
Sheets	62.00	"	—

* OPA Maximum Price.

Kraft—per cwt.—Carload Quantities Zone A, f.o.b. Mill

Superstandard Wrapping	*$5.25	@	—
No. 1 Wrapping	*5.00	"	—
Standard Wrapping	*4.75	"	—
Standard Bag	*4.375	"	—

* OPA Manufacturers' Prices.

Tissues—Per Ream—Carlots

White No. 1	1.12½	"	—
White No. 1 M. G.	1.10	"	—
White No. 1½	1.00	"	—
White No. 2	.90	"	—
Anti-Tarnish M.F.	1.20	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—

Toilet—1 M. Sheets—Per Case

Unbleached	4.25	"	—
Bleached	5.70	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—

Paper Towels, Per Case—

Unbleached, Jr.	2.60	"	—
Bleached, Jr.	3.20	"	—

Manila—per cwt.—C. l. f. a.

No. 1 Jute	11.25	@	—
No. 1 Manila Wrapping, 35 lb.	6.00	"	6.25
No. 2 Manila Wrapping, 35 lb.	5.75	"	6.00

Boards, per ton—

News	*48.00	@	—
Chip	*45.00	"	—
Sgl. Mla. Ll. Chip	*60.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*63.00	"	—
Binders Boards	84.00	"	116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

100% Rag Ext.	Bonds	Ledgers
No. 1	$39.10@$46.00	$40.25@$47.25
100% Rag	32.20 " 37.75	33.35 " 39.25
85% Rag	.... "	29.90 " 35.00
75% Rag	23.00 " 27.00	24.15 " 28.25
65% Rag	.... "	22.80 " 27.75
50% Rag	18.70 " 22.75	19.90 " 24.25
25% Rag	16.40 " 20.00	17.55 " 21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds	Ledgers
No. 1	$10.55@$12.75	$11.70@$14.25
No. 2	9.65 " 11.75	10.80 " 13.25
No. 3	9.20 " 11.25	10.35 " 12.50
No. 4	8.90 " 10.75	10.05 " 12.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper. Delivered in Zone 1:

No. 1 Glossy Coated	$13.65	@	$15.50
No. 2 Glossy Coated	12.40	"	14.00
No. 3 Glossy Coated	11.60	"	13.25
No. 4 Glossy Coated	11.15	"	12.75
No. 1 Antique (watermarked)	10.25	"	11.75
No. 2 Offset	9.60	"	11.00
A Grade E. F.	9.35	"	10.75
A Grade S. & S. C.	9.60	"	11.00
B Grade E. F.	8.85	"	10.25
B Grade S. & S. C.	9.10	"	10.50
C Grade E. F.	8.55	"	9.75
C Grade S. & S. C.	8.80	"	10.00
D Grade E. F.	8.25	"	9.50
D Grade S. & S. C.	8.50	"	9.75

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight, Not Exceeding OPA Allowances.

Bl. Softwood Sulphite	$76.00		
Unbl. Softwood Sulphite	65.00	@	66.00
Bl. Hardwood Sulphite	73.50		
Unbl. Hardwood Sulphite	63.50		
Bl. Mitscherlich	81.00		
Unbl. Mitscherlich	72.00	@	82.00
N. Bleached Sulphate	86.00		
S. Bleached Sulphate	79.00		
N. Semi-Bleached Sulphate	82.00		
S. Semi-Bleached Sulphate	75.00		
N. Unbl. Sulphate	73.00		
S. Unbl. Sulphate	63.50		
Bl. Soda	66.00		
Unbl. Soda	63.00		
Groundwood	46.00		

Transportation Allowances Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area)	10.50
West Coast (out area)	16.50

	50%-80% Air Dry Weight
Northeast	$11.50
Lake Central	11.50
Southern	14.00
West Coast (in area)	9.50
West Coast (out area)	15.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum prices.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	6.50	@	7.25*
Silesias No. 1	—	"	5.75*
New Unbleached	6.75	"	7.50*
Blue Overall	—	"	5.50*
Fancy	—	"	3.50*
Washables	—	"	3.00*
Bleached Khaki Cuttings	—	"	4.25*
Unbleached Khaki Cuttings	—	"	3.50*

* OPA Maximum Prices.

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MILLS:

Mechanicville, New York
Luke, Maryland
Covington, Virginia
Tyrone, Pennsylvania
Williamsburg, Pennsylvania
Charleston, South Carolina

Old Rags

White, No. 1—			
Repacked	*3.80	"	—
Miscellaneous	*3.20	"	—
White, No. 2—			
Repacked	*2.90	"	—
Miscellaneous	*2.65	"	—
Third and Blues—			
Repacked	*2.20	"	—
Miscellaneous	*1.80	"	—
Roofing Rags—			
No. 1	*1.55	"	—
No. 2	*1.45	"	—
No. 3 (bagging)	*1.35	"	—
No. 4	*1.35	"	—
No. 5A	*1.35	"	—
Old Manila Rope	5.75	"	—

OPA Maximum Prices.

Foreign Rags

All Prices nominal

New Rags			
New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.50
New Light Prints	3.00	"	3.25
Old Rags			
No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—
No. 4 White Linens	2.25	"	3.25
No. 1 White Cotton	4.25	"	4.75
No. 2 White Cotton	3.25	"	3.75
No. 3 White Cotton	2.50	"	3.00
No. 4 White Cotton	1.90	"	2.20
Extra Light Prints	2.00	"	2.40
Ord. Light Prints	1.75	"	2.15
Med. Light Prints	1.55	"	1.95
Dutch Blue Cottons	2.25	"	2.50
French Blue Linens	3.00	"	—
Checks and Blues	2.00	"	—
Linsey Garments	1.90	"	2.00
Dark Cottons	1.50	"	1.60
Old Shopperies	1.30	"	1.45
New Shopperies	1.45	"	1.50
French Blues	2.25	"	2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	4.25	@	4.35
Wool Tares, light	4.25	"	4.50
Wool Tares heavy	4.50	"	5.00
Bright Bagging	4.50	"	4.85
Manila Rope—			
Foreign	—	"	—
Domestic	*5.75	"	—
Jute Threads	5.50	"	—
No. 1 Sisal Strings	*4.00	"	—
Mixed Strings	2.00	"	—

* OPA Maximum Price.

Old Waste Papers

(F. o. b. New York)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Envelope Cuts	3.12½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, one cut	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Mixed Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
Mixed Groundwood Colored Shavings	.90	"	—
Overissue Magazines	1.67½	"	—
No. 1 Heavy Books & Magazines	1.57½	"	—
Mixed Books	.85	"	—
No. 1 White Ledger	2.17½	"	—
No. 2 Mixed Ledger, colored	1.87½	"	—
New Manila Envelope Cuttings, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
Extra Manilas	1.85	"	—
Mixed Kraft, Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
Triple Sorted, No. 1 Brown Soft Kraft	2.50	"	—
New 100% Kraft Corrugated Cuttings	2.35	"	—
No. 1 Assorted Old Kraft	1.75	"	—
New Jute Corrugated Cuttings	.90	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.15	"	—
Box Board Cuttings	.72½	"	—
White Blank News	1.65	"	—
Overissue News	.85	"	—
No. 1 News	.75	"	—
No. 1 Mixed Paper	.70	"	—
Old Corrugated Containers	.82½	"	—
Mill Wrappers	.85	"	—

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp	.21	"	—
Fine Polished—			
Fine India	.26	"	—
Unpolished—			
Box	.17¼	"	—
Paper Makers	.17	"	—
Tube Rope	.19	"	—
Wall Paper	.20½	"	—
Wrapping	.23	"	—
Soft Fiber Rope	.19	"	—
Cotton	.25	"	—

(Hard Fiber)

Medium Java	.18	"	—
Mex. Sisal	.16	"	—
Manila	-	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White No. 1	.07¼	@	.07½
New White No. 2	.04½	"	.05
Light Silesias	.04½	"	.04¾
Silesias, No. 1	.04	"	.04¼
Black Silesias, soft	.03¾	"	.04
New Unbleached	.07¼	"	.07½
Washable Prints	.03¾	"	.03½
Washable No. 1	.02	"	.02¼
Blue Overall	.04½	"	.05½
Cottons—According to grades—			
Washable shredding	—	"	.01¾
Fancy Percales	.03¼	"	.03½
New Black Soft	.02¾	"	.03
New Dark Seconds	1.75	"	2.00
Khaki Cuttings—			
No. 1 O. D.	.03	"	.03¼
No. 2 Mixed	.02¼	"	.02½
Corduroy	.01¾	"	.02¼
New Canvas	.04¾	"	.05¼
New Black Mixed	—	"	.02½

Domestic Rags (Old)

White No. 1—Repacked	3.80	"	—
White No. 2—Repacked	2.90	"	—
Miscellaneous No. 1	3.20	"	—
Miscellaneous No. 2	2.65	"	—
Thirds and Blues—			
Miscellaneous	1.80	"	—
Repacked	2.20	"	—
Black Stockings—			
(Export)	Nominal		
Roofing Stock—			
Foreign No. 1	Nominal		
Domestic No. 1	1.55	"	—
Domestic No. 2	1.45	"	—
Roofing Bagging	1.35	"	—
Old Manila Rope	5.75	"	—

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.00	"	3.50
Sisal Rope	3.75	"	—
Mixed	1.00	"	1.50
Scrap—			
No. 1	3.25	"	3.50
No. 2	1.75	"	1.80
Wool Tares, heavy	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	3.75	"	4.00

Old Papers

(F. o. b. Phila)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
Soft White Shavings, one cut	2.50	"	—
White Blank News	1.65	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 White Ledger	2.17½	"	—
No. 2 Ledger, colored	1.87½	"	—
No. 1 Heavy Books & Magazines	1.67½	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.70	"	—
Box Board Cuttings	.72½	"	—
Ksaft Corrugated Cuttings	2.25	"	—
Old Corrugated Containers	1.15	"	—
Overissue News	.85	"	—
No. 1 News	1.00	"	—

BOSTON

Old Papers

(F. o. b. Boston)

OPA Maximum Prices

No. 1 Hard White Shavings, unruled	2.87½	@	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.57	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.70	"	—
Overissue News	.85	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.15	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	3.75	@	4.00
Sisal Rope No. 1	*4.75	"	—
Sisal Rope No. 2	*4.25	"	—
Mixed Rope	1.35	"	1.50
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75	"	3.00
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75	"	—
Soft Jute Rope	4.50	"	5.00
Jute Carpet Threads	3.00	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	3.60	"	3.85
Wool Tares—			
Foreign	(nominal)		
Domestic	4.25	"	—
Aust. Wool Pouches	4.65	"	4.87½
New Burlap Cuttings	4.75	"	5.00
Heavy Baling Bagging	4.00	"	4.25
Paper Mill Bagging	2.50	"	3.00
No. 2 Bagging	1.35	"	—

* OPA Maximum Price.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04½	@	.04¾
Fancy Percales	.04¾	"	.05
New White No 1	.06¾	"	.07
New Light Flannelettes	.05½	"	.06
Canton Flannels, Bleached	.06	"	.06½
Underwear Cutters, Bleached	.06¾	"	.06¾
Underwear Cutters, Unbleached	.05¾	"	.06
Silesias No. 1	.06	"	.06½
New Black Silesias	.03	"	.03½
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached	.06½	"	.06¾
Blue Cheviots	.05½	"	.06
Fancy	.02¾	"	—
Washable	.02¾	"	—
Khaki Cuttings	.02¾	"	.03
O. D. Khaki	.03½	"	.03¾
Corduroy	.03¾	"	.03½
New Canvas	.06¼	"	.06¾
B. V. D. Cuttings	.06¼	"	.06¾

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—Repacked	3.80	@	—*
White No. 1—Miscellaneous	3.30	"	—*
White No. 2—Miscellaneous	2.65	"	—*
Twos and Blues, Repacked	2.20	"	—*
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—*
Miscellaneous	1.80	"	—*
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	1.55	"	—*
No. 2	1.45	"	—*
No. 3	1.35	"	—*
No. 4	1.35	"	—*
No. 5, Quality A	1.35	"	—*
Quality B	1.20	"	—*
Quality C	.95	"	—*
* Old Manila Rope	5.75	"	—

* OPA Maximum Prices.

Foreign Rags

(F. o. b Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

OPA Maximum Prices.

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.17½	"	—
No. 1 Heavy Books & Magazines	1.67½	"	—
White Blank News	1.65	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
No. 1 Assorted Old Kraft	1.75	"	—
Overissue News	.85	"	—
No. 1 News	.75	"	—
No. 1 Mixed Paper	.70	"	—
No. 1 Roofing Rags	1.55	"	—
No. 1 Roofing Bags	1.45	"	—